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MONTHLY REPORT

OF THE

DEPARTMENT OF AGRICULTURE

FOR

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# MONTHLY REPORT.

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STATISTICAL DIVISION,  
DEPARTMENT OF AGRICULTURE,  
*Washington, D. C., December 26, 1876.*

SIR: I present herewith, for publication, a digest of current statistical returns; a statistical argument showing that production is not declining; a report upon the work of European experiment-stations; notes on the work of the Chemist and Microscopist; and miscellaneous statistics and domestic and foreign market-reports.

Respectfully,

J. R. DODGE,  
*Statistician.*

HON. FREDERICK WATTS,  
*Commissioner.*

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## CORN.

The returns of November make the corn crop only 2 per cent. short of the great crop of last year, and fully 50 per cent. greater than the crop of 1874. The aggregate is 1,295,000,000 bushels. Less than 1 per cent. of the crop is raised in New England, scarcely 6 in the Middle States, 20 in the Southern, 44 in the Ohio basin, and 29 west of the Mississippi.

The product of the South is 10,000,000 bushels greater than last year, that of New England is 300,000 greater, and there is less in the Middle and Western States. It is 73,000,000 greater than in 1870, and yet the percentage of the total crop of these States is only 20 against 23 in the census-year, because the increase has been still greater in the West. In 1850, the proportion of these States was 42 per cent. of the aggregate, and, in 1860, 32. Thus, while the South is increasing its corn product, there is profitable opportunity for a much larger increase.

The States of the Ohio basin, seven in number, including Michigan and Wisconsin, increased their proportion from 39 per cent. in 1850 to 41 in 1860, and since that date continue to advance their proportions, the percentage being 44 in 1870 and at the present time, notwithstanding the more rapid progress of corn-growing in the States of the Missouri Valley.

These States, Minnesota, Iowa, Missouri, Kansas, and Nebraska, produced only 7 per cent. in 1850, advancing to 15 in 1860, to 21 in 1870, and 28 in 1876. The increase in Kansas has been most rapid of late, nearly equaling in amount in this year the crop of the much more populous State of Missouri. Iowa, as yet, grows more than four-tenths of the crop of this section.

The States producing less than in 1875 are New Hampshire, Rhode Island, those of the Atlantic coast from New York to North Carolina, Mississippi, Tennessee, Michigan, Illinois, Iowa, and Missouri. Illinois is credited with about 250,000,000 bushels, and Iowa with 155,000,000. Next in rank are Ohio, Indiana, Missouri, and Kansas. These six States produce six-tenths of the total product. Tennessee, which once held the highest rank in the country, now stands first in the Southern States, followed by Texas, Alabama, and Georgia.

By far the heaviest rate of increase, 75 per cent., has been in Wisconsin, where the crop of last year was a very poor one.

The extension of this culture westward continues to be rapid. This year, the Missouri Valley, together with the western half of the Upper Mississippi, yields two-thirds as much as the area from that river eastward to Pennsylvania, including the States on both sides of the Ohio.

In quality, the crop is superior to its predecessor. New Hampshire is an exception in New England. In New Jersey, there was injury by drought. North Carolina and Florida are slightly below the standard; and slight inferiority is indicated in Mississippi, Louisiana, Arkansas, Tennessee, Missouri, and Nebraska. In some portions of the South and West, there is complaint of rotten and worm-eaten corn. In all the States, the crop, as a whole, reached full maturity without injury by frost.

There has been an increase of area in all sections, aggregating about two million acres, the advance very slight in the Gulf States from Alabama to Louisiana, and scarcely perceptible in the Middle States. It is largest west of the Missouri. Wisconsin shows the heaviest increase in the Northwest, and Texas and Georgia in the South.

## COTTON.

The returns of November indicated an extremely favorable season for gathering cotton, except in some portions of North Carolina. The following synopsis was telegraphed last month: "Frost has injured the top crop in the northern belt, notably in Arkansas. The fiber is cleaner than usual and of superior quality in the southern belt. Drought in the Gulf States, rain-storms in the Carolinas, the boll-worm in the Southwest, and the caterpillar in certain locations near the Gulf coast are chief causes of injury to the crop. The harvest will be completed at a much earlier date than usual. The crop must be smaller than that of last year, however favorable and long the remaining season for gathering. In comparison with the last crop, the percentages of the Atlantic coast States are relatively larger by reason of the poor returns of 1875, and smaller in the Southwest from comparison with the remarkable yield of that region. They are as follows: North Carolina, 92; South Carolina, 99; Georgia, 110; Florida, 100; Alabama, 77; Mississippi, 78; Louisiana, 83; Texas, 100; Arkansas, 74; Tennessee, 101. The average is between 88 and 89."

To facilitate comparison with returns of former years, the following tables of condition since 1870, for the last two months in which the condition of the growing crop is reported, are presented, averages be-

ing corrected by due consideration of the difference in production of the several States :

## OCTOBER.

States.	1876.	1875.	1874.	1873.	1872.	1871.
North Carolina.....	84	85	85	88	90	80
South Carolina.....	80	77	82	80	86	75
Georgia.....	85	71	80	82	88	72
Florida.....	80	70	81	76	75	73
Alabama.....	70	94	75	78	82	75
Mississippi.....	83	96	74	75	78	76
Louisiana.....	82	90	62	72	72	73
Texas.....	91	88	70	80	85	72
Arkansas.....	86	103	55	83	75	82
Tennessee.....	91	90	56	90	90	94
Apparent average.....	83.2	86.4	72	80.4	82.1	77.2
Corrected average.....	82.7	88.0	71.7	79.3	81.8	76.7

## SEPTEMBER.

States.	1876.	1875.	1874.	1873.	1872.	1871.
North Carolina.....	93	90	87	95	101	82
South Carolina.....	91	80	86	86	95	80
Georgia.....	90	76	77	90	96	78
Florida.....	83	75	77	85	92	75
Alabama.....	83	87	81	85	88	80
Mississippi.....	87	98	74	82	90	80
Louisiana.....	90	88	62	80	86	77
Texas.....	87	94	65	92	94	80
Arkansas.....	97	99	47	93	78	95
Tennessee.....	119	96	52	92	92	96
Average.....	90.5	89.2	71.0	87.9	90.7	81.5

We further give the record of condition during each month of the present year :

States.	June.	July.	August.	Septem-ber.	October.
North Carolina.....	101	105	96	93	84
South Carolina.....	98	90	97	91	80
Georgia.....	103	103	104	90	85
Florida.....	82	98	89	83	80
Alabama.....	94	100	103	83	70
Mississippi.....	92	94	92	87	83
Louisiana.....	89	89	89	90	82
Texas.....	90	99	106	87	91
Arkansas.....	95	97	98	97	86
Tennessee.....	93	103	120	119	91
Average.....	94.4	97.3	99.4	90.5	82.7

It will be seen that, in 1875, the September average, 89.2, was only reduced to 88 in October; while the September figures of this year, 90.5, fell in October to 82.7. The season for gathering has continued very favorable, and the harvest is more nearly completed than for several years at this season.

We have collected no systematic reports in December, and therefore place on record only the condensed results of the previous returns of the season as factors in the calculations concerning the possible crop. The appropriation for the support of this division for the present fiscal year being inadequate even to the office-work of record and compilation,

and the printing-fund being already nearly exhausted, there is little inducement to attempt investigations which cannot be properly made, or published if made.

### POTATOES.

As returns for condition, during the latter part of the season, have foreshadowed, the potato crop, in production, falls not only far below the extraordinary crop of 1875, but considerably below an average crop. Among the causes of diminished yield, drought was the most widespread and effective. During the season for the formation and growth of the tubers, excessively dry weather prevailed, with a few local exceptions, throughout the entire section north of the thirty-sixth parallel and east of the Rocky Mountains, the section in which the potato crop is mainly grown. The drought was the most severe and protracted in the Middle and Eastern States, except a northern belt including the greater part of Maine. Within this designated area also the beetles east of the Mississippi and the grasshoppers west effected some reduction in localities, though not to a serious extent. Reduction by premature decaying of the vines, from blight or rust, is noted in New York, (Wyoming and Chautauqua,) Pennsylvania, (Sullivan,) Virginia, (Pulaski,) Ohio, (Franklin,) Michigan, (Iosco, Montcalm, and Fond du Lac,) Wisconsin, (Outagamie,) and California, (Humboldt and Sonoma;) by rotting, in Virginia, (Highland,) North Carolina, (Beaufort and Haywood,) West Virginia, (Pocahontas, Upshur, and Braxton,) Ohio, (Lorain and Preble,) Michigan, (Chippewa and Kent,) Illinois, (Saline and De Kalb,) Wisconsin, (Grant, Brown, Clark, and Jackson,) Iowa, (Jones and Howard.) Another cause of diminished production is an unusual decrease in acreage, especially in States which grow this crop extensively, amounting to 15 per cent. in New York, 31 in New Jersey, 7 in Pennsylvania, 11 in Ohio, and 8 in the entire country. This was occasioned, in part, by the very low prices realized for last year's crop. Among the Northern States east of the Mississippi, Maine alone wisely planted an undiminished acreage; and her farmers are now being well rewarded by very remunerative prices for a crop which averages only 3 per cent. below that of last year in production, while it is 6 per cent. above in quality. Vermont has the next best crop in the eastern section, falling 13 per cent. below that of 1875; while Connecticut falls 50 and Rhode Island 85. The great failure in the latter State was owing to a drought protracted beyond precedent, helped efficiently in its work of reduction by the beetle. New York, growing one-fifth of the entire crop, and more than twice the quantity of any other State, falls off from last year 49 per cent.; other States, (in the order of importance,) fall off, Pennsylvania, 44 per cent.; Ohio, 32; Illinois, 36; Michigan, 58; Wisconsin, 10; Iowa, 34; Indiana, 20; New Jersey, 68.

The small crop grown in the southern section approached nearer to last year's production; equaling it in Alabama, and rising 1 per cent. above it in South Carolina. These States and Oregon, 114, are the only ones in which the production is not below that of last year. The entire crop is about 34 per cent. less than the previous one. There is also a very general decline in quality. Maine, 106; Delaware and South Carolina, 100; Kentucky and Oregon, 101, are the only States not indicating a decline. The lowest figures are in Rhode Island, 44; followed by Connecticut, 64; New Jersey, 68; New York, 81; Pennsylvania, Michigan, and Kansas, 84. Other States range from 88 to 99.

A few items among the local details are worthy of mention. In Kent, Rhode Island, owing to ravages of the beetle, none except the very

earliest came to maturity. Gloucester, New Jersey, did not produce nearly a sufficiency for home use. In Pennsylvania, Sullivan reports that early decay of the vines rendered the late-planted not worth digging, and proved nearly fatal to the whole crop; Beaver, that the yield does not average over 20 bushels per acre, and they are rotting. In Dorchester, Maryland, the beetle occasioned an inferior crop in both yield and quality. In Virginia, early frost reduced the crop 20 to 50 per cent. in Elizabeth City; and in Dinwiddie, early drought prevented most of the crop from vegetating. In Haywood, North Carolina, "a peculiar rot," new to that locality, greatly diminished the product. In Hunt, Texas, the crop was so abundant that growers gave one-half of the product for harvesting. Williamson, Tennessee, reports a product so large that immense quantities were being shipped north and south. The crop has rotted to such an extent in Pocahontas, West Virginia, that scarcely enough are left for seed. In Ohio, while Hancock, Clark, Hocking, Warren, Montgomery, and Miami return fine crops, Medina reports the poorest for ten years; Seneca, the poorest for many years; and Preble, a large portion of the product worthless, though appearing sound on the exterior. Michigan reports like contrasts; Delta returning a good crop of first-rate quality; but Oakland the poorest ever grown, in both yield and quality.

Among the agricultural products of Juneau, Wisconsin, the potato crop was the most profitable, yielding 200 bushels per acre, and selling at 40 to 45 cents per bushel. In Clackamas, Oregon, on the 1st of October, many fields were still green and growing. Early frosts of unprecedented severity greatly damaged the crop in Utah.

Prices have been incidentally stated by our reporters, in different sections; in New York, Washington, 65 cents against 20, last year; Indiana, Kosciusko, 60 to 80 cents, and advancing; Illinois, Boone, 60 cents against 10 last year, and scarcely any sale at that; Missouri, Cole and Holt, 25 cents; Kansas, Cowley and Woodson, 50 cents, and in the latter "will soon be \$1."

### SWEET POTATOES.

The crop of 1875 was a fair one in both yield and quality; that of this year very nearly equals it in both respects. The greatest falling-off in yield is in Louisiana, 25 per cent., owing to a general and severe drought at the critical season. The same cause, operating in a less degree, reduced the product below that of last year, 13 per cent. in Florida and Alabama; 12, in Mississippi; and 7, in Georgia. The average reduction is not over 3 per cent. in any other State, while in a majority of those producing the crop the yield equals or exceeds that of 1875. The excess averages 11 per cent. in Kentucky, 9 in New Jersey, 8 in South Carolina, 7 in Missouri, 5 in Delaware, 4 in California, and 2 in Tennessee, West Virginia, Indiana, and Kansas. A majority of the States growing sweet potatoes and those producing the larger part of the crop also report an average quality equaling or exceeding that of the previous crop.

### HAY.

The reported entire product is 8 per cent. above that of last year, and the average quality about 5 per cent. better. Maine returns a product 2 per cent. greater than that of 1875, which was 10 per cent. above the previous crop. In the other New England States, there is a decline in product, averaging 12 per cent., owing to the severity of the drought before the crop was cut. In the remainder of the country, except on

the northern border of the Gulf, where but little hay is grown or saved, the crop was generally in advance of the drought; the dry weather commencing about the time of harvesting, and thus greatly contributing to good curing. The only States out of New England not returning a product greater than in 1875 are New York, Delaware, and Alabama, 100; Mississippi, 93; Louisiana, 88; Kansas, 97; Nebraska, 95. The falling-off in the latter two States is owing, in part at least, to the fact that better cereal crops than last year weakened the motives for "putting up wild hay." States indicating a large relative increase in product are California, 59 per cent.; Virginia, 35; Kentucky, 33; New Jersey, 30; Illinois, 20; Tennessee, West Virginia, and Ohio, 15; Texas, 14; Michigan, 13; Arkansas, 11.

As a rule, to which the exceptions are few and slight, the quality is superior to that of last year's crop, both in respect to intrinsic excellence and the condition in which it was cured and housed or stacked. The States returning an average quality not superior to that of the previous crop are Maryland, 100; North Carolina, 99; Mississippi, 95; Louisiana and Arkansas, 97; Minnesota and Oregon, 98. Indiana reports an average superiority of 21 per cent.; Kentucky, 15; Vermont, Ohio, and Illinois, 11. In the latter two States, the crop was greatly damaged last year by excessive rains during the entire harvest season. Our reporters this year occasionally note injuries by wet weather in harvest, the most important of which are injuries to the clover crop, while curing, in parts of Indiana and Illinois; but statements that the crop was cured without injury, or in the best condition, are the rule. County returns of unprecedented crops are frequent. In Pennsylvania, Sullivan reports a crop more abundant than ever before; Tioga, the heaviest product ever gathered, all housed in good condition. The product in Henrico, Virginia, was never exceeded; Bath also produced much the best crop for years, and secured it in excellent condition. Williamson, Tennessee, reports immense quantities, mostly German millet, put up in fine condition; Lincoln, Kentucky, an immense crop of excellent quality; Sandusky, Ohio, the best crop ever grown. Unprecedented and well-saved crops are also returned from Howard and Wabash, Indiana; Fayette, Illinois; Walworth and Outagamie, Wisconsin; Henry, Iowa; Maries, Missouri; and Sonoma and Placer, California.

## BEANS.

Returns from all sections indicate that the product is about 7 per cent. less than last year. Grasshoppers in the Northwest and drought in other sections are the principal causes of reduction. The States in which the product is not less than in 1875 are Delaware, 100; Vermont, 101; California, 102; North Carolina, 103; Florida and Arkansas, 105; Wisconsin, 110; Oregon, 122. Among these States, last year, Wisconsin reported 85 and California 82, as compared with the crop of 1874. As dry weather prevailed very generally during the season of curing, the quality (which is not specifically reported) is probably better than average.

## PEAS.

In the Northern States, returns for this crop have exclusive reference to the product of shelled peas, for table use or for provender; but in the Southern States, while varieties for table use are included, the principal crop is of the variety known as cow-peas, of which the vines constitute an important forage-product. Texas returns a product 5 per cent.

above a fair crop in 1875; but, in all the other Gulf States, the product was largely reduced by drought. In Clarendon, South Carolina, and Wilkes, Georgia, the crop was also damaged by early frost. In the northern tier of Southern States the product fully equals that of last year. Among the Northern States, Minnesota returns a product 38 per cent. above last year's short crop; Vermont and Delaware return 100. In the remaining States east of the Missouri, the product falls somewhat below that of 1875. Kansas reported last year 33 per cent. above the previous crop; this year 21 below, reduced by grasshoppers. Nebraska, last year, 122; this year, 100. California produced 5 per cent. above a short crop last year. The entire product is about 5 per cent. short of that of 1875.

### BUCKWHEAT.

Last year the product exceeded that of the previous crop; this year it falls about 8 per cent. short. Drought at the time of filling was the principal cause of reduction; but in parts of Pennsylvania, Maryland, and Virginia, storms of rain and wind in harvest, or after the crop was matured, did much injury. In parts of the Ohio Valley, the crop did not fill well, owing to excessive wet weather. It was damaged by frost in Saginaw and Oakland, Michigan; Stark, Indiana; and Jefferson, Missouri; and much reduced by grasshoppers in Iowa, Kansas, Nebraska, and Colorado. Massachusetts and Connecticut report a product equal to last year's; but in New York it was 34 per cent. less; New Jersey, 23; Pennsylvania, 26. North of the Ohio, the comparative figures for 1875 and 1876 are, respectively, in Ohio, 105 and 90; Michigan, 132 and 88; Indiana, 112 and 92; Illinois, 83 and 96; Wisconsin, 45 and 155. In illustration of the relation of these figures to each other, it may be observed that if the crop in Wisconsin last year had been equal to the previous one—that is, 100—this year's product being what it is, and now represented by 155, would have been a fraction short of 70. High figures mean a large increase over the previous crop; but if, for instance, the product for 1875 was but a fourth of an average crop, 200 for 1876 would only indicate half a crop. West of the Mississippi, the crop, except in Minnesota, 109, was much less than in 1875, the figures being, in Missouri, 237 and 93; Kansas, 206 and 72; Nebraska, 544 and 78. The product in Kentucky was 2 per cent. greater than last year, and in Oregon 5 per cent. In all the remaining States it fell below.

### SORGHUM.

Returns show an increase of about 14 per cent. over last year's comparatively large crop. The States indicating the highest relative increase are, Georgia, 38 per cent.; Virginia, 37; Kentucky, 32; Texas, 27; Alabama, 19; Tennessee, 14. The only States reporting a product less than last year are, Iowa, 11 per cent.; Maryland and Nebraska, 7; Kansas, 5. Certain counties report a remarkable percentage of increase: in Virginia, Page, 300 per cent.; Madison, 100; Georgia, Shelby, 300; Meriwether, 200; Alabama, Clarke, and Crenshaw, 100; Mississippi, Lincoln, 100; Texas, Rusk, 400; Titus, 200; Arkansas, Ashley, 100; Sharp, 80; Williamson in Tennessee, Taylor in Kentucky, Henry in Ohio, and White in Illinois, 100 each; Clay in Missouri, 200. Good quality is generally reported. Great improvement in the quality of the sirup, resulting from the introduction of improved machinery and methods of evaporating, is specified in different localities. The return from Gwinnett, Georgia, states that the sirup of a large and valuable crop

"equals the best New Orleans;" and from Gibson, Tennessee, that New Orleans sirup has been almost supplanted by the abundance, excellence, and cheapness of sorghum sirup—the price being only 25 cents per gallon. The return from Braxton, West Virginia, also makes special reference to the good quality of the sirup. In Fulton, Arkansas, while other varieties of sorghum were fine, rust injured the "black-top" 20 per cent. In Tennessee, McMinn reports the largest yield, and Blount the largest product ever known; but in the latter the increase is from increased acreage, "as the yield is less per acre than when first introduced." From Ohio, there are some complaints that, while the juice is abundant, it is inferior in quality, lacking in sweetness.

## TOBACCO.

The tobacco counties reporting the comparative product make returns not quite so favorable in the aggregate as those of last year. A decrease of product is indicated in Massachusetts, Connecticut, New York, Maryland, Virginia, North Carolina, and Tennessee. An increase is indicated in Pennsylvania, Ohio, Indiana, and Illinois. Kentucky reports about the same as last year.

In Ohio, Indiana, and Illinois, the increase in product is extraordinary. In Ohio, Montgomery reports the best and finest crop of seed-leaf tobacco ever produced; Monroe, that the quality was depreciated by excessively wet weather. In Illinois, the season was very propitious for maturing and curing in Saline; in Johnson, the crop was eaten by worms, the ravages of which were worse than for years. Vernon, Missouri, also had more tobacco-worms than ever before; but other returns from Missouri are favorable in respect to both yield and quality.

The quality of the entire crop averages about the same as that of last year. The depreciation is not noticeable in Connecticut, Virginia, and North Carolina. The average quality is superior to that of the previous crop in New Hampshire, Massachusetts, Pennsylvania, Kentucky, Indiana, Missouri, Ohio, and Tennessee. In Maryland, the quality is reported coarse and dark in Charles; inferior in Calvert, owing to bad weather for curing. In Virginia, the quality is indifferent in Powhatan and in Madison, except that the smaller part, cut before the September storms, is good; very inferior in Mecklenburgh; much damaged by worms and disfigured by the September gale in Dinwiddie; damaged by early frost in Henry, and by a bad season for tobacco in Fluvanna; in Prince Edward, the later plants were green when cut, but the larger portion matured well, and was harvested in good condition; the season was unusually favorable for harvesting and curing in Botetourt; a crop of fine quality was well housed in Carroll, and a full crop well cured in Montgomery. The reported causes of deterioration in North Carolina are worms, early frosts, and the cutting of late crops before maturity in order to avoid frosts. In Tennessee and West Virginia, only slight deterioration is reported from early frosts and the cutting of late crops prematurely to avoid frost. In Kentucky, Daviess returns the largest crop ever grown, except that of 1872. The estimate for product is 10,000,000 pounds, of which not over 2 per cent. was injured by frost; but perhaps 10 per cent. was not well cured, being cut rather too green; in Fleming, a very fine crop, of fair quality, has been housed; in Metcalfe, not more than half a crop, but of excellent quality; in Harrison, the crop has been damaged in the barns.

## FLAXSEED.

Incomplete returns from Ohio indicate a product equal to that of last year; Indiana, 1 per cent. less; Illinois, (having an extraordinary crop last year,) 15 per cent. less. These three States represent over three-fourths of the entire crop. Among other States in which the production is of any account, Iowa alone indicates an increase over last year New York, 1 per cent. less. Scattering returns from the States west of the Mississippi indicate that the production of flax is extending. In Missouri, less than half of the counties making returns for this crop reported any for the census of 1870; in Kansas, only 4 out of 17; and in Nebraska, only 1 out of 10.

## FRUIT.

APPLES.—Almost the only complaint about the apple crop is that its superabundance has greatly diminished its market value. Maine returns a yield 20 per cent. below that of the previous crop, the causes being previous injury to the trees by caterpillars, depredations by them this season, and, in the southwest part of the State, too dry weather for the maturing of the crop. Vermont falls 4 per cent. below, ascribed to the effects of the severe winter. Drought and September storms reduced the figures in New Jersey to 95, in Delaware to 55, and in Virginia to 92. Missouri reports a production falling 28 per cent. below that of 1875. Severe spring-frosts, canker-worms, coddling-moths, an insect allied to chinch-bugs, hail-storms, and, chiefly, premature falling-off from causes not explained, are the principal sources of reduction. With these exceptions, in the entire section north of the 36th parallel, and east of the Pacific slope, the yield exceeds that of last year; the average excess for the whole area being not less than 17 per cent. The excess in New York is 22 per cent.; Pennsylvania, 23; Ohio, 41; Michigan, 24; Indiana, 39; Illinois, 16; Wisconsin, 54; Iowa, 43; New Hampshire, 63. The coddling-moth was destructive to the crop in Utah. In California and Oregon, the product was slightly less than last year. In the Southern States, in which the crop is of less account, the general yield is considerably below that of last year, owing mainly to drought. South Carolina alone comes up to 100. With rare local exceptions, the quality is reported as superior; the fruit being comparatively large, fair, and free from worms.

The following statements, selected and condensed from notes of our reporters, are given as indicating the general drift in respect to yield, quality, and prices: In New York, Albany returns a good crop, very low in price; Otsego, a very abundant crop, lower in price than for years; Genesee, so abundant that the best winter-apples sell for \$1 per barrel; Sullivan, so abundant that many will be left ungathered; Monroe, the largest crop ever known; Onondaga, very abundant and fine; in Allegany, the best sell on the trees at 15 cents per bushel, and many may be had without money and without price. In Pennsylvania, Clearfield, Mifflin, Tioga, Westmoreland, and Armstrong report abundant crops of very fine quality; in Mifflin, winter-apples sell at 15 cents per bushel; in Bucks, the September gale blew 75 per cent. of the fruit from the trees. The same gale destroyed two-thirds of the crop in Kent, Delaware, and did immense damage to it in Cecil, Maryland; Baltimore County reports a large crop, but, contrary to the general tenor, of inferior quality. In Virginia, the statements respecting quality are uniformly favorable, ranging from good to very fine. In portions of Ten-

nessee, the crop was extra fine; but in McMinn nearly all fell off before ripening, from the combined effects of drought and insects.

In Kentucky, Anderson, Fleming, and Henry report the largest and best crop ever known; in the last named, the yield was so great as to almost annihilate the market-price. In Ohio, Butler returns a larger crop than has been known for forty years, and that of fine quality, free from all the usual defects; Geauga and Meigs, apples a drug in the market; Hancock, so superabundant that thousands of bushels are left to rot on the ground; Perry, an enormous crop, of excellent quality; Miami and Franklin, the largest crops for 20 years, also of excellent quality; Preble, the largest crop ever known, making a demand for cider-barrels which outruns the supply; in Trumbull, cider sells at 5 to 8 cents per gallon. In Michigan, Oakland saved in good condition the largest crop ever known; Wayne, a crop never exceeded in yield or quality. In Indiana, Ripley and Howard have the largest and best-matured crops ever harvested; in Kosciusko, winter-apples, well handled, sell in market at 25 to 40 cents per bushel; in Noble, the best varieties of winter-apples sell for 25 cents per bushel; in Floyd, large quantities are being manufactured into cider, vinegar, and brandy. In Illinois, Boone and Carroll, the crop was so abundant that apples are worth but little in market, and are being mostly manufactured into cider; Hamilton reports winter-apples as knotty and imperfect; and Johnson, that apples rotted on the trees, worse than for many years.

The return from Walworth, Wisconsin, reports that the crop is so abundant as to be fed to hogs—an unprecedented thing in that State; La Fayette had much the finest crop ever raised there; Columbia, an abundant crop, quite free from worms. Decatur and Henry, Iowa, had the largest crop ever grown. In Placer, California, the product surpasses that of any crop for many years. In Frémont, Colorado, the trees were well loaded; but, long before the fruit was ripe, the grasshoppers stripped them entirely of foliage.

**PEARS.**—The pear-crop falls below the small crop of 1875. The extensive prevalence of the tree-disease known as pear-blight appears to be the leading cause of this diminution. Its prevalence and effect in reducing the crop to a greater or less extent are noted in New York, New Jersey, Pennsylvania, Georgia, Louisiana, Texas, West Virginia, Illinois, and Iowa. The only States in which the product does not fall below that of last year are New Hampshire, 103; Vermont, 100; Wisconsin, 119; Iowa, 105; Oregon, 101; no one of which produces a large crop. In the remaining States, the decline is about 20 per cent. Very few counties report full crops; but in Howard, Indiana, pears are plenty and fine; Decatur, Iowa, produced the largest crop ever known; and Placer, California, a crop surpassing any other for many years.

**GRAPES.**—The returns indicate a product somewhat less than in 1875. The small crop in New England averaged better than last year. Pennsylvania returns 103, but in the other States north of the Potomac the falling-off averages about 12 per cent. There appears to be a reduction from last year in the Southern States, averaging about 10 per cent. In the interior east of the Mississippi, the product is less than in 1875; the greatest reduction, 19 per cent., being in Illinois. West of the Mississippi, Arkansas reports a falling off of 32 per cent., Missouri of 15. In California, the product is reported two per cent. larger than last year.

Except in localities where the yield was reduced by the effects of the hard winter or late spring frosts, the almost exclusive cause of reduction has been a widespread tendency to mildew and rot. But in Bucks, Pennsylvania, a good crop was largely injured by bees and wasps; in

Cecil, Maryland, immensely damaged by the storm of September 17; and in Clay, Missouri, the yield was diminished by injuries to the vines by grasshoppers the previous season. Sonoma, California, reports that the abundance of the crop reduces the price so low as to leave no margin for profit; native varieties of fine wine-grapes selling at \$8 to \$10, and foreign varieties at \$12, per ton; choice table-grapes at 1½ cents per pound, and very choice, packed with extra care for the eastern market, at 2 cents.

#### WINTER-WHEAT.

**ACREAGE.**—Our December returns indicate that the acreage in winter-wheat has been increased about 5 per cent. over that of the previous year. The small area sown in the New England States is fully maintained, and some additions were expected to be made after our returns were sent in, as in some counties it is customary to delay sowing this grain till just before freezing. All of the Middle States return an acreage equal to that of last year, except New York, which loses 8 per cent. The South Atlantic coast States report a considerable increase, a small deficiency in Georgia being overcome by a marked increase in North Carolina and South Carolina. In the Gulf States, Alabama and Mississippi report an increase which overbalances the decline in Texas. Florida and Louisiana grow but insignificant crops. The inland Southern States all report an increased acreage. North of the Ohio River, Michigan and Wisconsin report a decrease of wheat-acreage, but the other States report increased breadths, enlarging the acreage of this section about 3 per cent. West of the Mississippi River, Missouri enlarges her acreage at least a third, Kansas one-eighth, and Nebraska nearly a half. The Pacific States also report a large increase.

**CONDITION.**—The condition of the crop appears from the returns to be about 10 per cent. above average on the whole. The Atlantic slope, from Maryland northward, enjoyed very favorable conditions of seeding and growth, though the Hessian fly has done considerable damage in several counties of Pennsylvania, especially in early-sown wheat. Later-sown crops give greater satisfaction. With the exception of South Carolina, the South Atlantic and the Gulf States are below average. Drought retarded both the sowing and the growth of the crop in many counties, while in others the fear of Hessian flies and grasshoppers caused the sowing to be delayed as long as possible. Injuries by grasshoppers are reported in several counties of Texas. A depressed condition is also noted in Arkansas and Tennessee, the latter being 10 per cent. below average. Grasshoppers are complained of in a few cases, but drought was a more general cause of disaster. West Virginia and Kentucky show a superior condition, though seeding was somewhat late on account of drought. All the States north of the Ohio River report a superior condition, especially Ohio and Indiana, which enjoyed remarkably fine conditions for seeding and growth. The Hessian fly appeared in a few very early sowings, but its ravages were comparatively harmless. In several localities of Illinois and Wisconsin, the wheat appears to be better rooted than usual and better prepared to resist the trying fluctuations of winter in those States. West of the Mississippi River, Minnesota and Iowa report a condition slightly above average, while the other States of this region are considerably deficient. Grasshoppers were very destructive at many points, necessitating a resowing of the crop. Wheat sown late to avoid this pest has started very imperfectly. In California, good rains during October facilitated plowing and wheat-seeding, causing a considerable enlargement of acre-

age, but in several counties the moisture has not been sufficient to bring out the crop. Oregon reports a very promising crop. From Dakota come reports of grasshopper damages. In the Choctaw Nation, Indian Territory, the crop is reported as very satisfactory.

#### WINTER-RYE.

ACREAGE.—The acreage in winter-rye in 1876 does not materially differ from that of 1875. A small increase is shown in New England and in the States north of the Ohio River, which about counterbalances the decline in the other sections; the Pacific States reporting no appreciable change.

CONDITION.—The condition of the crop, on the whole, is about average. A superior condition appears in the Middle States, South Atlantic States, in the States north of the Ohio River, and on the Pacific slope, while in the other sections there is a deficiency. In some portions of the country, the crop was seeded late on account of unfavorable weather; but generally it was placed in the ground in good order, and gained a good growth before winter set in. In the regions visited by the grasshoppers, the sowing of this crop, as in the case of wheat, was delayed, and early-sown crops more or less damaged by these insects, some being entirely destroyed. Reports of such injuries come mostly from the trans-Mississippi region.



Table showing the condition of the crops, &amp;c., on the 1st day of November, 1876.—Continued.

States.	BEANS.	PEAS.	BUCK- WHEAT.	FLAX.	COTTON.		SOR- GHUM.	SUGAR-CANE, (not sorghum.)	GRAPES.	APPLES.	PEAS.
	Product com- pared with last year.	Product com- pared with last year.	Product com- pared with last year.	Product com- pared with last year.	Indicated pro- duct com- pared with last year.	Indicated pro- duct (lint) per acre, in pounds.	Product com- pared with last year.	Indicated pro- duct com- pared with last year.	Product com- pared with an average crop.	Product com- pared with an average crop.	Product com- pared with an average crop.
Maine.....	95	95	96	.....	.....	.....	.....	.....	92	80	88
New Hampshire.....	95	94	91	.....	.....	.....	.....	.....	99	163	103
Vermont.....	101	100	94	.....	.....	.....	.....	.....	100	96	100
Massachusetts.....	93	.....	100	.....	.....	.....	.....	.....	105	115	96
Rhode Island.....	62	.....	.....	.....	.....	.....	.....	.....	105	115	92
Connecticut.....	88	.....	.....	.....	.....	.....	.....	.....	100	130	96
New York.....	88	86	100	.....	.....	.....	.....	.....	96	122	75
New Jersey.....	79	83	68	99	.....	.....	.....	.....	81	95	81
Pennsylvania.....	92	95	74	88	.....	.....	.....	.....	103	123	85
Delaware.....	100	100	80	.....	.....	.....	100	.....	87	55	75
Maryland.....	91	99	81	.....	.....	.....	137	.....	89	101	89
Virginia.....	103	96	96	100	99	175	93	.....	94	92	75
North Carolina.....	103	96	96	69	92	184	108	.....	103	91	77
South Carolina.....	96	92	.....	.....	99	140	110	.....	103	103	63
Georgia.....	97	87	.....	.....	110	151	138	.....	87	76	69
Florida.....	103	84	.....	.....	77	167	112	.....	91	72	32
Alabama.....	83	84	.....	.....	78	195	119	.....	90	79	58
Mississippi.....	80	70	71	.....	.....	.....	.....	.....	113	44	34
Louisiana.....	100	73	.....	.....	100	202	137	.....	75	58	24
Texas.....	98	105	108	.....	.....	.....	168	.....	102	82	77
Arkansas.....	105	80	.....	.....	101	152	114	.....	86	65	60
Tennessee.....	97	99	88	93	.....	.....	114	.....	86	61	81
West Virginia.....	96	102	98	89	.....	.....	106	.....	94	101	88
Kentucky.....	98	103	102	.....	.....	.....	132	.....	101	109	86
Ohio.....	98	96	90	100	.....	.....	102	.....	96	141	81
Michigan.....	89	98	88	.....	.....	.....	.....	.....	107	134	92
Indiana.....	98	99	92	99	.....	.....	108	.....	101	138	97
Illinois.....	86	99	96	85	.....	.....	107	.....	81	116	81
Wisconsin.....	110	94	135	.....	.....	.....	106	.....	91	154	119
Minnesota.....	86	138	109	66	.....	.....	121	.....	88	120	.....
Iowa.....	83	87	107	.....	.....	.....	89	.....	104	143	105
Missouri.....	93	96	93	81	96	222	101	.....	83	72	60
Kansas.....	73	79	72	96	.....	.....	95	.....	103	116	80
Nebraska.....	74	100	78	80	.....	.....	93	.....	131	133	80
California.....	102	105	88	.....	.....	.....	.....	.....	102	97	96
Oregon.....	122	99	105	121	.....	.....	.....	.....	105	94	101

## IS PRODUCTION DECLINING?

Agricultural speakers and writers often give the impression, without positive assertion, that we produce less in proportion to population than formerly. If this is so, we eat less than formerly, for we export more. But no intelligent person, after due deliberation, will assert that we feed less to farm-animals or live less generously ourselves than our fathers fed and fared. A statistical answer in the negative has been made by the Statistician of this Department, in an address delivered before the Agricultural Congress at its last session in Philadelphia, as follows:

There are problems presented daily which only agricultural statistics can solve, and upon which largely depends the future prosperity of the farming interest. We cannot here enumerate them, but a reference to one or two may suffice. The inquiry has been often made of late, Is production declining? It has been assumed that we produce in proportion to population less of the great staples of production than formerly. It is the province of agricultural statistics to decide the question. The census alone cannot determine it. Such is the fluctuation in rate of yield, that the supply of a given staple may be actually increasing, while the product of the census-year may be less than in its predecessor ten years before. For instance, corn for 1869 was returned 760,941,549 bushels, and in 1859 the figures were 838,792,742. It has often been asserted, on the strength of these returns, that corn-production was declining, not only *per capita*, but in absolute comparison of quantity. Is it so? The year 1869 witnessed what in country parlance is called "a failure" of the corn-crop. It is plainly folly to take such a crop for comparison. And this fact illustrates the absolute necessity of annual estimates to supplement decennial returns. Since 1869 there have been six harvests exclusive of the present one. Of these six, the largest and smallest stand in juxtaposition: the one in 1875, the largest ever made, is 1,321,000,000 bushels; and the other, another failure, in 1874, 850,000,000 bushels. The increase in a single year is 56 per cent. In 1870 and 1872 the product was nearly 1,100,000,000; the average of annual estimates, for the six years since the census, 1,047,000,000 bushels; and this confirms the opinion, founded on careful study of the history of cropping in 1869, that it was scarcely more than three-fourths of a full crop. Now, let us examine a period of twenty-six years. We find that the yield *per capita* in 1849 was 25.5 bushels; in 1859, 26.6 bushels; and in 1869, the year of a three-fourths crop, 19.7 bushels—the same result as that deduced from the period since that census. If we take the year 1875, the result is excessive, 30 bushels *per capita*, but include it in the period of six years past, and we have 25.5—precisely the supply of 1849.

As to wheat, a general deduction from comparison of census exhibits is less erroneous. The increase in round numbers was from 100,000,000 to 173,000,000, and again in 1869 to 237,000,000. Now, the latter was a large crop, yet the average for the six subsequent crops is 266,000,000, while the estimate for the last year of the six was 292,000,000. Distributed according to population, there were 4.3 bushels per head in 1849, 5.5 in 1859, 7.46 in 1869, and for the period since 6.6 bushels. This shows an increase of more than 50 per cent. in the proportion of supply in twenty-six years, and is exactly in accordance with the history of the several crop-years, and is a proof of the substantial correctness of these estimates.

The export figures illustrate further the fact of the large increase of wheat-production. The total export of wheat and flour in fifty years is equivalent to 1,062,000,000 bushels of wheat, of which 91,000,000 were shipped during a single year, 1874. The exports of one-half of this period up to 1850 were only 178,000,000—less than twice those of 1874. The heavy increase during recent years is especially noteworthy, nearly half this semi-centennial aggregate having been shipped in ten years. While our population has nearly doubled since 1849, the quantity of all cereals taken together has more than doubled. The census reported 867,000,000 bushels. Allowing something for incompleteness of that enumeration, the 2,000,000,000 bushels produced in 1875 allow a distribution of 46 bushels to each inhabitant, in place of 37.4 census-bushels, or possibly 40, with a complete enumeration. Our average supply since the last census exceeds 40 bushels; and thus is demonstrated the remarkable fact that, with our rapid increase in numbers, perhaps without a parallel, we not only keep up our high standard of cereal production, but actually advance it. This is owing to our vast areas in instant readiness for the plow, to our advance in variety and perfection of agricultural machinery, and to the stimulus of a foreign demand, which has never been so pressing as during the last ten years. It is possible to double our present population without diminishing this high rate of supply. There is more danger at present of overproduction and unremunerative prices than of scarcity. The proportion engaged in agriculture in the West is still too large, and far too large in the South;

and the withdrawal of workers from rural to other industrial arts would not only greatly facilitate the creation of wealth, but would stimulate invention, labor-saving skill, and industry in agriculture.

Having reached the conclusion that corn-production is not declining, and that the supply of wheat has increased 50 per cent., what can we say as to the meat-supply and the numbers of horses? As to the latter, it is not found, according to the fears of too conservative farmers of a former generation, that multiplying railroads tends to diminish the use of horses. More horses are now used in taking people to the train than were formerly required to perform the whole journey. The census reports only the horses of the farm, without reference to those of the town or city; but, for comparison, taking the numbers in proportion to population, there were nearly twenty to each one hundred people in 1850, quite twenty in 1860, and, notwithstanding the waste of the war, eighteen in 1870. The increase since has at least equaled the advance in population. Coming to cattle, while we know that the numbers in the census are too low, especially for Texas, California, and the Territories, we may use them for comparative purposes. From 1850 to 1860, we find the number of all kinds of cattle slightly increasing from 77 to 81 to each hundred of the population, and then witness a decline to 62 in 1870. Since that date the numbers have increased, but not materially faster than the population. The consumption in the war was a prominent cause of the decline, and a growing preference to horses as a substitute for working-oxen tended to further reduction. The supply of sheep *per capita* was somewhat greater in 1870 than in 1860, the ratio rising from 70 to 73, but less than in 1850, when there were 93 per hundred of population. But the most marked decline in supply has been in swine; the figures in these decennial periods being respectively 129, 105, and 65. The tendency is to still further decline in some of the principal swine-districts.

There is another statistical point of especial interest in this connection. While numbers have declined in proportion to population, the value of all farm-animals divided among the population would give about \$24 per head in 1850, \$34 in 1860, and \$44 in 1870. Not only has scarcity increased the value, but improvement in breeds has added size and weight, so that with smaller relative numbers we are able to feed our people and ship more beef and pork and lard than ever. Here is food for reflection. Here is the cause of advancing prices of beef and pork. And it is fortunate that increase in meat-production is consonant with a higher and more intensive agriculture; that it is, in fact, one of the essential conditions of such improvement. And if we can act upon the suggestion of Mr. Harris, in his address last evening, and perfect breeds of meat-producers that shall be able to assimilate a larger proportion of the fat-and-meat producing elements contained in the food supplied, we shall hasten the adoption of a system of agriculture that shall be restorative and not exhaustive.

We thus learn from statistics that grain-growing exclusively, though remunerative as a temporary expedient, is a speculation, and not true farming. Land in the prairies worth \$50 per acre is bought for \$5, and its true value is discounted in installments; *i. e.*, the soil is plundered piecemeal, and converted into wheat and cash to furnish means for fencing and house-building, and to supply capital to the pioneer farmer. In this point of view, it has been remunerative as a pioneer expedient; but, with a farm equipped for the work of a long future, the superior profit of a restorative system, in which domestic animals fill an important part, cannot be questioned, either in the deep prairies of Illinois or the rich bottoms of the Missouri Valley.

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## CHEMICAL MEMORANDA.

BY WILLIAM MCMURTRIE, CHEMIST.

**BAT GUANO.**—In addition to the samples of this important product sent to the Department by J. A. V. Pue, Bandera, Texas, this gentleman has forwarded another sample from a different cave, which our analysis has proved to be of greater value than any we have yet analyzed. There are, doubtless, very many deposits of great extent, of which we have been unable to obtain any knowledge, that will be as valuable as that represented by this sample. This one, like others of high grade, contained broken scales of insects, and is in excellent condition for direct application to the soil.

The results of our analysis are as follows:

Moisture.....	9.12
Ash, by charring and ignition.....	38.00
Total phosphoric acid.....	6.09
Potash.....	0.47
Organic nitrogen, equivalent to 11.15 per cent. potential ammonia.....	9.18
Nitric acid.....	1.69
Actual ammonia.....	1.18

These figures undoubtedly place the material on a par with many of the concentrated fertilizers found in the markets, and should rouse sufficient interest and attention to secure for it an extensive application in southern agriculture.

AMERICAN TANNING-MATERIALS.—Under this head, I propose to submit the results of the analyses of the vegetable substances containing sufficient of tannic acid to make them of value for tanning that were collected and prepared for exhibition in the late International Exhibition in Philadelphia. The list may not comprise all the indigenous products that are of value in this respect, but some of them, at least, have not yet received extended application.

The method employed in our estimations was devised by F. Jean, and published in the "Bulletin de la Société Chimique de Paris," (xxv, 511,) and depends upon the absorption of iodine by tannic acid. By this method, the quantity of tannic acid found in the various samples respectively was as follows:

	Per cent.
Ground sumac, (mixed,) from Winchester, Va.....	24.18
Sumac, ( <i>Rhus cotinus</i> .) Hallsborough, Va.....	24.08
Sumac, ( <i>Rhus glabra</i> .) Georgetown, D. C.....	26.1
Leaves of sweet fern, ( <i>Comptonia asplenifolia</i> .) from near Boston, Mass.....	9.42
Leaves of <i>Polygonum amphibium</i> , from Nebraska.....	11.6
<i>Ephedra antisiphilitica</i> , from the table-lands of Arizona and Utah.....	11.9
Bark of sweet-gum, ( <i>Liquidambar styraciflua</i> .) from District of Columbia.....	8.36
Bark of red-oak, ( <i>Quercus rubra</i> .) from Canton, Ill.....	5.55
Bark of white oak, ( <i>Quercus alba</i> .) from Canton, Ill.....	7.85
Crushed quercitron bark, ( <i>Quercus nigra</i> .) from Winchester, Va.....	6.47
Bark of <i>Quercus coccinea</i> , from Canton, Ill.....	7.78
Bark of <i>Quercus macrocarpa</i> , from Canton, Ill.....	7.85
Bark of hemlock, ( <i>Abies canadensis</i> .) Van Etenville, N. Y.....	9.5

AMERICAN WINES.—The collection referred to also contained a series of specimens of American wines, manufactured and contributed by Messrs. Bush & Son & Meissner, of Bushberg, Mo.; and, since the series embraced wines made from nearly all the varieties of grapes employed in the manufacture of wine in this country, the results of their analyses are considered of some interest. The wines, being made by the same parties, are more likely to be subject to similar conditions in the process, and comparison between them is therefore more reliable.

Name of brand.	Year of vintage.	Composition of wine.				
		Specific gravity.	Alcohol, by volume.	Alcohol, by weight.	Acid,* per cent.	Solids, per cent.
1. American sherry .....			17.0	14.23	0.37	6.55
2. Norton's Virginia Seedling .....		0.995	12.2	9.85	0.66	2.31
3. Hermann .....		0.990	13.9	11.24	0.48	
4. Alvey .....	1873		10.1	8.13	0.78	2.52
5. Taylor Bullet .....	1874	0.995	12.4	10.01	0.48	1.73
6. American port .....		1.03	13.1	10.59	0.48	11.30
7. Martha .....	1873	0.995	11.3	9.11	0.43	1.72
8. Missouri claret .....	1874	0.9975	11.8	9.51	0.72	2.37
9. Herbemont .....	1874	0.995	11.8	9.51	0.57	2.42
10. Catawba .....	1874	0.990	12.0	9.69	0.37	1.66
11. Catawba .....	1875	0.995	11.0	8.87		1.53
12. Catawba, sweet .....	1875	1.015	14.4	11.65	0.40	7.86
13. North Carolina Seedling .....	1874	0.990	13.5	10.92	0.48	1.80
14. Cynthia .....	1874	0.995	12.8	10.33	0.54	3.15
15. Goethe .....	1873	0.990	11.8	9.51	0.42	1.68
16. Clinton .....	1874	0.998	13.4	10.83	0.45	3.70
17. Delaware .....	1874	0.990	13.1	10.59	0.40	2.18
18. Ives Seedling .....	1874	0.995	11.2	9.03	0.54	2.29
19. Norton's Virginia .....	1873	0.995	12.6	10.17	0.47	2.46
20. Concord .....	1873	1.000	9.4	7.56	0.60	2.38
21. Concord .....	1875	0.9975	8.7	6.99	0.48	2.36
22. Concord, white .....	1874	0.995	12.2	9.85	0.47	1.55

Calculated as dry tartaric.

**FIXATION OF NITROGEN BY THE INFLUENCE OF ATMOSPHERIC ELECTRICITY.**—It has for a long time been well known that plants contain more nitrogen than can possibly be supplied by the ordinary constituents of the soil, together with the amount carried down by rain in the form of nitric acid and ammonia. This difference is undoubtedly due to the utilization of atmospheric nitrogen; but the manner in which this is brought about has not heretofore been satisfactorily explained. Johnson, Armsby, and others have made valuable contributions to our knowledge of this phenomenon in the results of their investigations into the absorption of nitrogen by non-nitrogenous organic matter in presence of alkalis. But a more satisfactory explanation will be found in the results of the late investigations of M. Berthelot. In papers presented to the Academy of Sciences of Paris, he has shown that nitrogen is directly absorbed at ordinary temperatures by organic matters under the influence of the electric current, and that this absorption may take place either with pure dry nitrogen and the hydrocarbons, in which case oxygen is completely excluded, or with moist woody principles and dextrine. It operates equally well with pure nitrogen and atmospheric nitrogen. The electric currents were developed by means of enormous tensions and with a large Ruhmkorff coil, that is, under conditions comparable to the electrical tension during thunder-storms. The application of the results to vegetation are therefore legitimate, but only for these exceptional conditions. The question then arose whether this absorption of nitrogen will not also take place under the influence of much more feeble electrical tensions, such as are continually produced in the atmosphere. Experiments instituted for the examination of this question gave affirmative results.

The apparatus employed for this purpose by M. Berthelot consists of two very light glass tubes, one placed within the other, and both hermetically sealed. In the inner tube was placed a piece of silver or platinum foil, rolled in cylindrical form and placed against the sides to act as an armature. To one end of this foil was attached a piece of platinum wire, which was soldered in both the inner and the outer tube. This wire communicates with a conductor electrified by the atmosphere,

in order to establish between this internal armature and a certain atmospheric stratum an electrical equilibrium. On the other hand, a piece of tin foil rolled about the external tube in contact with the air communicates with the soil. An interval of glass separates the tin foil and the platinum wire, and this interval is carefully coated with a triple layer of gum lac, in order to prevent any hygrometric loss and all communication between the two armatures.

In the annular space which separates the two tubes are placed strips of filter-paper, or two or three drops of a sirupy solution of dextrine, and pure nitrogen, or even ordinary air, subsequently introduced. The introduction of the gas and the different material is effected by means of a gas-tube soldered to the extremities of the apparatus, which are afterward carefully closed with the lamp. This always precedes placing the armature of tin and the varnish of gum lac.

Between the two armatures is established an electrical tension equal to that between the soil and a stratum of air two meters above it, the amount being deduced from the daily observations of atmospheric electricity made with a Thompson-Branly electrometer at the meteorological station at Montsouris. With this electrical tension established, twelve tubes of the kind described containing respectively moist paper and moist dextrine, some of them being supplied with pure nitrogen, some of them with atmospheric air, all being hermetically sealed except two, which were so arranged that a current of air could pass through them and over their contents; all were allowed to remain undisturbed for two months, and at the end of this time the material was found to have absorbed nitrogen, forming compounds which were decomposed by soda-lime at 300° to 400° C., with formation of ammonia. The amount of material employed in each of the tubes was less than one gram, while the amount of nitrogen taken up was valued at one or more milligrams. It will thus appear that the quantity of nitrogen that may be fixed upon a surface covered with organic matter becomes considerable from electrical influences without taking into account other influences so well known.

In two of the tubes, Berthelot noticed the formation of green spots, due to microscopic algæ, arising probably from germs introduced with the material. In these tubes, more nitrogen was fixed than in any of the others. In one of the tubes supplied with pure nitrogen, the gas acquired a fetid odor. In the conclusion of his paper, Berthelot says:

These experiments explain the influence of a natural cause upon vegetation, which has been quite considerable, but which has until now been almost unsuspected. Heretofore the study of atmospheric electricity in its relation to agriculture has been with reference to luminous and violent manifestations only, such as thunder and lightning. In all hypotheses, only the formation of nitric and nitrous acids and nitrate of ammonia has been considered. Further than this, no doctrine relative to the influence of atmospheric electricity has yet been presented. Now, in my experiments, it has been a question of a totally new and absolutely unknown action, which takes place continually under a clear sky, determining a direct fixation of atmospheric nitrogen within the proximate principles of vegetable tissues. In the study of the natural causes capable of affecting the fertility of soils, and of acting upon vegetation, causes which we endeavor to determine by meteorological observations, we should hereafter take into account not only differences in the action of light and heat, but also the electrical state of the atmosphere.

**NEW FEVER CURE—*Croton adenaster*.**—In a late number of the "El Oberrado Médico de Méjico" is described a plant of the family of *Euphorbiaceæ*, called *picosa* or *eachiladera*, (*Croton adenaster*,) which, on account of its febrifugic properties, has become a rival of the cinchonas. According to the analysis of Dr. L. M. Imenez, it contains an acid, a soft greenish resin having an acid reaction, a yellow oleo-resinous

coloring matter, a volatile balsamic substance, and certain salts. The greater part of the valuable constituents are extracted by dilute alcohol.

**FORMATION OF CARBO-HYDRATES IN PLANTS.**—An important contribution to our knowledge of the formation of the carbo-hydrates in plants has lately been made by Herr A. Stutzer, of Göttingen, in a paper presented to the Chemische Gesellschaft zu Berlin.

The views held by leading authorities on the subject vary so materially that the author was led to make a series of culture-experiments in order to test them. Liebig and Rochleder hold that the organic acids (oxalic, tartaric, &c.) form the transition-links between atmospheric carbonic acid and the carbo-hydrates; while other authorities, such as Davy, Sachs, &c., hold totally different views, believing that they are formed directly without intermediate steps. For testing the views of Liebig, he experimented with young plants of *Brassica rapa*, which are distinguished for their moderate weight and rapid growth. For atmospheric carbonic acid were substituted oxalic and tartaric acids, their calcium compounds being found more favorable to the purpose. A formation of new leaves and an increase of weight of dry substance showed that these organic acids may, to a certain extent at least, take the place of carbonic acid in plant-nutrition. He further observed a decided exhalation of oxygen from water-plants, in direct sunlight, which had received very dilute solutions of oxalic or tartaric acid salts instead of carbonic acid.

He next endeavored to determine in what manner this change of the two acids into cellulose and carbo-hydrates takes place. He considers it possible by two ways: by gradual liberation of oxygen, a reduction taking place, as Liebig believed; or they may be first oxidized to carbonic acid, and from this condition further changed in presence of sunlight in the green leaves. To determine which of these metamorphoses takes place, the plants are inclosed in an atmosphere completely freed from carbonic acid. If, under such conditions, a reduction takes place, the plant can vegetate; but this is impossible if the acids must first change to carbonic acid by oxidation. Experiments in which the conditions thus described were observed showed that oxalic acid cannot be assimilated, that the plants rapidly diminish in weight and die. This proves Liebig's theory to be incorrect, and that oxalic acid cannot be the transformation-link between atmospheric carbonic acid and the carbo-hydrates, and, consequently, it can enter into the process of nutrition only after previous oxidation to carbonic acid. This being established for oxalic acid, it will also hold good for the carboxyl group, oxalic acid being a  $\text{CO} \cdot \text{OH}$  compound.

With tartaric acid and an atmosphere free from carbonic acid, very different results are obtained. The plants vegetate, though much more slowly than with admission of carbonic acid, the increase being only about one-half as great. This shows that, with tartaric acid, the alcohol groups may be changed directly into the formative material of the plant. This being accepted, the same law will hold good for the alcohol groups which have no analogous acids. This was clearly proven by growing plants with exclusion of atmospheric carbonic acid, and with glycerine as the source of carbonaceous matter.

It therefore appears that in presence of light the carboxyl group may, after previous oxidation, indirectly, while the alcohol groups may directly, enter into the formation of material in green plants.

Experiments made with plants under similar conditions to deter-

mine whether the methyl or methylen group may change to the final products, showed a formation of new leaves, and an increase of solid substance; but, since oxygen must first be taken up, these groups are subject to extensive metamorphoses.

**ALCOHOL IN PLANTS.**—Herr Gutzzeit, as the result of an extended series of experiments, has determined the presence of ethyl alcohol (alcohol of wine) in the unfermented juices of the green parts of plants, especially in *Heracleum giganteum*, (cow-parsnip,) *Pastinica sativa*, (common parsnip,) and *Anthriscus cerefolium*. He succeeded in separating a small quantity of volatile fluid, which he found to consist of one-third methyl alcohol and two-thirds ethyl alcohol. From examination of fruits in various stages of growth, he concludes that, as the process of ripening advances, the ethyl alcohol changes to other compounds, while the methyl alcohol remains constant.

**GERMINATION OF SEEDS IN NITROUS OXIDE.**—Notwithstanding the fact that Borsczow has found that nitrous oxide may replace oxygen in the respiration, Cassa's experiments show that wheat and corn cannot germinate in an atmosphere of the pure gas, and he has instituted experiments to determine what percentage may exist in atmospheric air without preventing germination.

**INFLUENCE OF PLANT-SECRETIONS UPON PUTREFACTION.**—Darwin, in his "Insectivorous Plants," describes a series of observations showing that the secretions of the glands peculiar to the leaves of sun-dew (*Drosera rotundifolia*) and plants of like character have the power of dissolving nitrogenous organic matter by an action similar to that of the gastric juice of animals, changing it to a condition in which it may be completely assimilated by the plant in its vital economy, and that, like the gastric juice, it has the power of arresting and preventing putrefaction. This power of preventing putrefaction has been found by Dr. Jaennel to be inherent in the roots of growing plants. To determine this fact, he macerated a couple of beans in water, and, having allowed the solution to stand for some time until putrefaction was thoroughly established, he divided the mass into two portions, when he placed in one part the roots of a young haricot shoot, the other being left exposed to the air. In a few days the bacteria were completely removed from the fluid subjected to the influence of the plant, *paramœcia*, smaller infusoria taking their place, while a greenish granular sediment settled to the bottom. Similar results were obtained from the influence of the roots of a bean-plant and the roots of a blade of oats upon 60 grams of putrifying fluid containing 1 gram of flesh. After five days, the solution contained infusoria but no bacteria, although the flesh was in active putrefaction. Dr. Jaennel considers that the arrest of putrefaction is due to the liberation of oxygen, which causes the bacteria to be replaced by infusoria, to the existence of which oxygen is so essential.

**INFLUENCE OF BORACIC ACID AND BORATES UPON VEGETATION.**—The late experiments of Dumas upon alcoholic fermentation having shown the antiseptic properties of boracic acid and its compounds, M. Eug. Péligot was led to study its influence upon plant-growth. The results of his experiments show that it has a distinctly poisonous action upon vegetation, causing death of the plants within a short time after its application. On account of this action upon plants, he seriously questions the propriety of its application to the preservation of meats to be used for food, since it may exert a similar influence in the animal economy. He says that all meats preserved with borax should be carefully washed before consump-

tion, but doubts whether complete removal can be effected in this way. He therefore recommended to the Academy of Sciences of Paris that a member of the medical section be requested to determine whether this substance, so poisonous to plants, is perfectly harmless to animals. M. Cl. Bernard was requested to perform this duty.

## MICROSCOPIC OBSERVATIONS.

BY THOMAS TAYLOR, MICROSCOPIST.

The following communication was addressed to the Commissioner of Agriculture, the 7th of September last, by the editor of the Cultivator and Country Gentleman :

SIR: The very general prevalence of grape mildew and rot, this season, gives increased importance to the questions which have so long perplexed practical grape-growers, viz: What is mildew? how many kinds of it are there? is the rot a distinct disease, or only a form of mildew? how is mildew propagated? what circumstances of soil, climate, or culture tend to favor its propagation? and what means, if any, can be relied on as a preventive of the evil? \* \* \*

Mr. Taylor, the Microscopist of the Department of Agriculture, performed a number of experiments with the spores of *Oidium Tuckeri* (the fungus of the foreign grape-vine) showing the facility with which they germinated when placed under cover of glass, with the requisite heat and moisture. He has also tested the effects of the fumes of sulphur, the vapors of turpentine, benzine, and carbolic acid, as preventives of the germination of the spores. In these experiments, the sulphur did not seem to have the effect usually ascribed to it, but the other articles entirely prevented the germination, and evidently destroyed the vitality of the spores. This result is a little surprising as regards the sulphur, since this substance has always been relied on as the surest preventive of mildew in graperies. I should be glad if the Microscopist would have the kindness to state whether these experiments have been repeated, or any cause discovered for the seeming anomaly. \* \* \*

In reply to these inquiries, I would say that mildew is now admitted to be a cryptogamic plant, belonging to a low order of fungi. Some mycologists affirm that there are as many as eighteen species which are injurious to the grape-vine. Two very distinct genera are especially noticeable, the *Erysiphe* and *Peronospora*. The former is principally confined to the foreign grape-vine, and the latter to the native. These two genera include most of the species of fungi which injure the grape-vine. Their modes of fructification, however, are different. In the *Erysiphe*, the germ-cells, which are called sporidia, are produced in cysts. These cysts are known by different names, as sporangia, asci, or thecae. This genus belongs to the *Sporidiifera*, the second of the two grand divisions into which fungi are divided. Sometimes late in the fall, *Erysiphe* appears on the old leaves of the native grape-vine. Another species, quite similar in form, is found on the willow, and known as *Erysiphe adunca*, Schlecht; and still another on the maple, *Erysiphe bicornis*, Link, having eight spores. I have never found *Erysiphe* on the young leaves of the native grape-vine. During the summer of 1871 and of 1872, the foreign vines of the Department graperies were infested by immense numbers of a species of *Erysiphe*. The sporangia had waving appendicles, but their terminal points were not hooked. Very dry and warm conditions of the atmosphere are favorable to the growth of the fungus *Erysiphe*, especially when graperies are imperfectly ventilated.

The second genus mentioned, *Peronospora*, belongs to the other grand division of fungi, called *Sporifera*. The spores, which occupy the same position and perform functions similar to the seeds of the higher orders

of phenogamic plants, are naked, that is, produced on spicules, and are not inclosed in cysts. By general consent, the term spore is limited to such germ-cells as are not produced in cysts. *Peronospora* appears to be favored in its growth by excessive moisture, followed by high temperature. Drainage, shelter, and a moderately moist and warm atmosphere are unfavorable to its growth, and consequently favorable to the healthy development of the native grape-vine.

As to whether grape-rot is a distinct disease, or only a form of mildew, mycologists generally believe that mildew of the grape-vine is the direct cause of the leaf-disease, and in some cases may lead to rot of the grape; but grape-rot may also be caused by excessive moisture and imperfectly-drained land.

Mildew is propagated by the spores (seeds) of fungi, which are produced in large numbers, and conveyed in the atmosphere to surrounding objects. The spores vegetate with great rapidity on the objects to which they are attached, and draw their nourishment principally through their mycelium (a form of roots) from the plants on which they grow, although a part is derived from the atmosphere.

Sulphur has generally been relied on as an antidote to mildew, and is commonly supposed to be an antiferment. Whatever its curative properties may be in relation to the grape-vine, sulphur is not an antiferment as chemically considered; and it cannot be classed as either an antiseptic or as a disinfectant, but it may have the power to foster a healthy growth of the living plant to which it is applied.

The following experiment will throw some light on this subject: To a pint of pure water I added half an ounce of the flowers of sulphur, and immersed in the solution two leaves of a foreign grape-vine. The liquid was exposed to a temperature of about 70° Fahrenheit. On the third day, fermentation was in full force. On the sixth, the odor of sulphuretted hydrogen was very strong, bacteria and mycelium of fungi covered the whole surface of the water, and the vine-leaves were decayed. I have frequently tried this experiment, using various kinds of foliage, and have always obtained the same results.

Some of the compounds of sulphur, as sulphurous acid, dilute sulphuric acid, and combinations of sulphur with the alkalies, are of an antifungoid character; but these differ so essentially from the flowers of sulphur in their chemical characters that they cannot necessarily be classed with that substance. Sulphurous acid has a great affinity for oxygen at ordinary temperatures, and is easily decomposed, while pure sulphur remains unchanged when exposed to the air only. When sulphur is boiled with caustic potash, soda, or lime, sulphides are formed, and such compounds are antiferments; but the caustic alkalies mentioned are themselves antiferments, and the addition of sulphur will not render them more so. Sulphur in a soluble condition may be absorbed by plants as food; and, since it is a well-established fact that albumen of both vegetables and animals is never free from sulphur, it may be that the application of sulphur in a soluble state may indirectly destroy fungoid growths by building up the organic structure of the diseased plants, and thus enabling them to resist decay by fermentation, which is generally, if not always, the result of cryptogamic plants growing on them.

The specimens of the French *Phylloxera vastatrix*, alluded to in the following letter, have been compared microscopically with the American *Phylloxera vastatrix*, and well-defined photographs made of both insects. They seem identical. Cuts will be prepared of both for future publication, with such observations as may be made by the entomologists of the countries to whom photographs have been sent.

MARSEILLES, September 26, 1876.

*To the Commissioner of Agriculture :*

SIR : I have the honor to send you, by post, some specimens of the *Phylloxera vastatrix* and some of the grape-roots which have been attacked by that insect, of the ravages of which, in France particularly, you are well aware. It is alleged, I believe unjustly, that we are indebted to your country for this destructive evil, the *Phylloxera* having been brought to this country in the first importation of American vines. By a comparison of our insects with yours, you can judge whether they are the same species. Please send me some specimens of your *Phylloxera*, and give me the particular habits of the insect.

The habits of ours are as follows :

1. During the summer, the wingless females remain about four months upon the roots.
2. In October, some of the females, after metamorphosis, taking flight from the ground, ascend to the stems of the vines, where they deposit their eggs.
3. The eggs, which are called winter-eggs, are hatched in the spring.

Yours, &c.,

C. JAQUÈME.

## AGRICULTURAL EXPERIMENT-STATIONS IN EUROPE.\*

BY PROF. W. O. ATWATER.

### WORK ON THE STATIONS.

The work of the experiment-stations consists chiefly in investigations and experiments directly or indirectly connected with the nutrition and growth of animals and plants useful in agriculture. Various branches of agricultural technology, and the testing of the quality and value of commercial fertilizers, food-materials, and seeds, are also objects of their labors. The work of some stations is confined to one, while that of others includes several of these branches. From data furnished by Nobbe, in the *Landwirthschaftlichen Versuchs-Stationen* for 1874, it appears that in that year, of the 40 German stations, 13 were engaged in researches in animal physiology; 20 in vegetable physiology; (these terms being here understood to include essentially the chemistry of animal and vegetable nutrition;) 5 were busied chiefly with studies in the chemistry and physics of the soil; 4 made a specialty of grape-culture and wine-production, and 5 of questions in agricultural technology. Besides the work above mentioned, a control of the trade in fertilizers by analyses of wares bought and sold, was exercised by 28, of that in seeds by 16, and of that in fodder-materials by 13 stations.

Some idea of the nature and scope of the work of the German stations may be obtained from the following accounts of the "scientific and practical labors" of a number of the Prussian stations "for 1874, with plans for 1875," taken from the "Annual report upon agricultural experiment-stations in Prussia, for the year 1874, to the minister of agriculture." The labors, at the stations named, were on the following topics:

HALLE.—1. On the weathering of phosphorites under the influence of the organic substances of the soil.

2. Experiments on the porosity of building-materials.
3. Alterations of nitrogen in the soil.
4. Investigations on moor-culture.
5. Investigations on the manufacture of alcoholic spirits.
6. Investigations on the estimation of the content of starch in potatoes.

A number of manufactories and stores of artificial fertilizers are

\* A continuation of an article in the annual report of 1875.

under the control of the station, and 1,600 analyses of these articles and of food-materials were made during the year.

*Work planned for 1875.*—The experiments 1-5, above, to be continued.

1. Investigations on the periodic increase in dry substance, &c., in the growth of the maize-plant. (Undertaken at the instance of the ministry of agriculture.)

2. Investigations on moor-culture in Holland.

3. On the alteration of the organized substance of nitrogenous fertilizers by fermentation.

WEENDE.—1. Rotten brood of bees, (analyses of materials collected in 1873.)

2. Developments of sugar-beets, (analyses of materials collected the previous year.)

3. Preparation of charts illustrating the more important experiments made at Weende, on the transformation of nutritive material by neat cattle and sheep. Besides this, analyses were made for private individuals of 64 samples of commercial fertilizers, 4 marls, 4 moor-soils, 1 cultivated soil, 5 waters, and 7 fodder-materials.

*Work planned for 1875.*—1. Experiments on the fattening of sheep of different breeds.

2. Testing the Pettenkofer respiration apparatus.

3. Investigations with sheep on the dependence of the digestion of food upon the proportion, by weight, of coarse fodder on the one hand, and of grains and roots on the other.

4. Experiments on the preservation of milk by use of salicylic acid.

BONN.—A considerable number of analyses were made by fertilizers, seeds, and fodder materials.

*Work planned for 1875.*—1. Investigations on the influence of salicylic acid upon the preservation of animal products.

2. Investigations on the composition and value of various materials for tanning.

3. Investigations of marls occurring in the Rhine region.

MÜNSTER.—1. On the liberation of free nitrogen in the decay of nitrogenous organic substances.

2. On the constitution of vegetable fats.

3. On the digestibility of wax.

4. On the chemical composition of human foods.

Analyses were made of 340 samples of fertilizers, 14 marls, 21 fodder-materials, 21 potable waters, 19 technical materials, and 179 samples of seeds.

*Work planned for 1875.*—Besides repetition, in fuller detail, of the work of 1874:

1. (At the instance of the Prussian ministry of agriculture.) Determination of the increase of dry weight of potatoes and corn in different stages of growth.

2. Determination of the amounts of the individual mineral ingredients which a water used repeatedly for irrigation will yield to the soil.

DAHME.—1. Chemical and microscopical investigations on the consumption and storage of reserve-materials in the potato-tuber.

2. Comparative experiments, in pots and in the field, on the effect of potash in natural kainit and in the manufactured potash salts.

3. Field-experiments with artificial waters.

4. Experiments upon the influence of different ways of cutting seed-potatoes upon the yield.

5. Experiments on the growth of oats and peas in the shade.

6. Experiments on the relation between the water-evaporation and decomposition of carbonic acid by plants.

7. Vegetation experiments, in purified quartz-sand, on the minimum amounts of nutritive materials required by pea-plants.

8. Daily determinations of atmospheric carbonic acid.

In addition to this were conducted numerous analyses in the interest of private individuals, investigations of seeds, observations on diseases of plants, extensive correspondence with agricultural societies, and several lectures.

*Work planned for 1875.*—Besides prosecution or repetition of 4, 5, 6, 7, and 8, above:

1. Cultivation of peas in aqueous solutions.

2. Experiments on the growth of barley when, both in soils which had and which had not been treated with marl, nitrogen was applied in the form of ammonia and of nitric acid.

3. Determinations of dry substance and nitrogen in maize and red clover at different periods of growth, (undertaken at the instance of the ministry of agriculture.)

4. Experiments with seeds of 20 different cultivated plants to determine the maximum, minimum, and most favorable temperature for germination.

5. Experiments on the growth of the potato-plant after removal of the seed-tuber.

6. Experiments on the retention of ammonia in sheep-dung.

More detailed accounts of some of the classes of experiments referred to above will, perhaps, be in place here.

#### EXPERIMENTS ON THE NUTRITION OF DOMESTIC ANIMALS.

In conducting the feeding-trials at the German stations, where nearly all of the later experimenting in this line has been done, neat-cattle, sheep, goats, horses, and swine receive different foods in varying proportions and mixtures, and the effects are accurately noted. Among the questions whose solution has been sought are, the chemical composition of different food-materials, and the proportions of food-ingredients in each, as albuminoids, carbohydrates, and fats, which are digested by different animals; the parts which they play in the animal economy; which elements are the "flesh-formers" and which the "fat-formers;" which make the fat, (butter,) and which the casein (curd) of the milk; which produce heat and muscular force, &c.; in what proportions and mixtures the animal will digest most fully and use most economically the food-ingredients; and, finally, what amounts of each will be needed and utilized to the best advantage by different animals and for different purposes.

The care and patience and thoroughness with which these experiments are conducted, the amount of labor and time and money they cost, and the ways that their results are applied, would be quite astonishing to most American farmers. Careful weighings and analyses are made of the food the animals consume, the milk they produce, the excrement and urine they void, and even the air they breathe. A single experiment often requires the hard and unremitting work of several chemists day and night for several weeks or months. "The accounts of the experimental investigations on the subject of animal nutrition that have been published during the last fifteen years in the German language alone would make what most people would call a good-sized library. The experiments thus described are numbered by hundreds and even thou-

sands, each one of which has cost the labor of days, weeks, or months. They have called in requisition the services of the ablest scientific men and the most successful farmers. They have involved an incalculable amount of thought, care, and toil in the laboratory, the stable, and the study. The labor, much of it of a menial sort, has been performed willingly, even enthusiastically, by those to whom it has brought not wealth, but only meager support. Nor has the work been in vain. These investigations have done a vast deal to settle the questions about stock-feeding, which occupy so much space in the papers, and which are as perplexing as they are important to millions of farmers on both sides of the Atlantic. Combined with the results of daily farm experience, they have shown for what purposes different kinds of fodder-materials are best fitted, and how much each is worth. They have taught the farmers how to make valuable fodder out of poor hay and straw; how to employ lucerne, seradella, clover, and other forage-crops to the best advantage; how to utilize waste products such as flax-seed and cotton-seed and the oil-cake made from them, also the refuse from the manufacture of sugar from beets, and of alcoholic spirits and starch from potatoes and grains. They have shown in what proportions these and scores of other fodder-materials should be mixed and used, so as to get the greatest benefit at the least cost." In brief, this sort of work is supplying German farmers with just the information they need in order to keep their stock, and produce meat, dairy-products, and whatever else comes from the maintaining of domestic animals, most rationally and with the largest profit.

#### EXPERIMENTS IN VEGETABLE NUTRITION.

While a very large part of the whole work of the European stations is devoted to the study of the nutrition of plants, to the ways in which their food is furnished by atmosphere, soils, and fertilizers, and used in their development, yet but comparatively few experiments are made on the growth of crops in the field. Experience has shown that the most reliable and useful results are obtained in the growing of plants in water containing various fertilizing materials in solution, or in artificial soils watered with such solutions. The influences to which the plant is subjected in its growth are thus under more perfect control, and the results, in a corresponding degree, more accurate and complete. "Some of the substantial advantages that have been gained as the immediate outcome of the work of the experiment-stations" are summed up as follows by Professor Johnson:

In respect to the food of plants, it has been settled that potash, lime, magnesia, iron, phosphoric acid, and sulphuric acid must be furnished to all agricultural plants through their roots and by the soil, in order to their growth. It has also been shown that soda, silica, and chlorine are not needful for the early growth of grain-crops, but that chlorine is essential for the perfection of the seed, and that silica is probably necessary to uniform blossoming and ripening. It is further proved that water must enter crops through their roots; that carbon, which constitutes more than half their weight, is superabundantly furnished by the air; that air and water together yield the materials out of which fully 90 to 93 per cent. of crops is built up, and that the soil has to give for their nourishment but the 2 to 8 per cent. of mineral matters which remain as ashes when they are burned, and the  $\frac{1}{2}$  to 2 per cent. of nitrogen which they also contain. It is likewise definitely settled that nitrates in the soil are the chief natural source of nitrogen, while the ammonia of manures, as well as a variety of substances containing nitrogen, and found in urine or formed in the decay of dead animals, likewise supply vegetation with nitrogen.

The experiment-stations have further ascertained, by a multitude of trials, what quantities and proportions of all these elements are needful to produce any given crop, and to what extent they are removed from the soil. On the other hand it has been determined what kinds of plant-food, and what quantities, are contained in the long list of manures and fertilizers, in all kinds of dung, urine, ashes, salts, guanos, phosphates, manufacturing refuse, &c. The remarkable quality of the soil to sift, as it were, some of the most

valuable because most costly fertilizing elements out of manures, retaining them in a form not easily or not largely removed by rain, and yet accessible to the roots of plants—the so-called absorbent or fixing power of soils—has also been elaborately studied. We have thus a pretty complete knowledge of what a crop requires for its growth, what it carries off from the land, what is returned in straw or tops, and where we may look for the most effectual and cheapest restoration of the materials thus removed. The well-instructed farmer is thereby put in possession of the data for keeping accounts between his soil and his crops, so that he can estimate with accuracy what the soil itself can be relied upon to contribute yearly toward their production, and what must be supplied yearly or during each rotation, by means of manures, in order to maintain, to develop, or to increase the fertility of the land.

#### THE EXPERIMENT-STATIONS AND THE TRADE IN FERTILIZERS.

One very important feature of the work of the stations is the analysis of commercial fertilizers. "It is just about twenty-five years since in Germany, as here, the trade in superphosphates, guano, and similar commercial fertilizers began. The same stupendous frauds by adulteration and dilution of good things were practiced there as they have been, and, we have great reason to fear, still are carried on here. But the experiment-station has perfectly cured and rooted out these evils in all the districts where it has been established and appreciated. The experiment-station there is prepared to furnish the farmers, at small cost, with an analysis of any fertilizer he proposes to buy. The farmers avail themselves of this aid. They will buy no fertilizer without an exact statement of its composition, and they buy with the understanding that any deficiencies in the stipulated amount of fertilizing matters shall be made good or deducted from the payment. Under such circumstances manufacturers can sell nothing that is not substantially what it claims to be. A further result of this system is that low-grade fertilizers are little sought, and those makers who can supply the best article, of uniform quality and at the lowest rates, have the business. With large sales the dealers prosper, while the consumers are satisfied with their purchases, and instead of trying to see how they can get along with small use of purchased fertilizers, they are studying how to use the greatest quantities to advantage. The fertilizer market in Saxony and Prussia, where the experiment-station has the universal sanction and confidence of the farmers, is just as settled and satisfactory as any branch of trade, and the farmers there buy superphosphate, guano, potash salts, &c., with as much security of fair dealing as we can feel in the purchase of sugar or nails."

"The German fertilizer-control system" consists essentially in arrangements by which dealers place their wares under the supervision of the stations, and guarantee them to contain certain percentages of valuable fertilizing ingredients; the guarantees being subject to verification by analyses made at the stations. Their stocks are also held open at all times to the inspection of the officers of the station, who, from time to time, without previous notice, select samples for analyses. A most important feature of the control consists in the provision very generally made by which purchasers have the privilege of having samples of the articles they buy analyzed, at small cost, or for nothing. Just here, indeed, is the superiority of the German system over the one in vogue in this country of having fertilizers examined by State inspectors. Besides an occasional examination of one or at most a very few samples of each particular brand, as the inspector may find it, the German farmers have the still further security which comes from the testing of samples of the articles they actually buy.

Illustrations of the benefit of such control-systems are as numerous as they are striking. "In the province of Saxony, in Prussia, there

was, in the year 1866, a considerable excitement about poor fertilizers. Thereupon a much more vigilant control was exercised; the result was a great improvement in the general character of the articles sold in the province during the year 1867. In Peruvian guano, for instance, there was an increase in the content of nitrogen of one per cent., or twenty pounds to the ton. It is calculated by the director of the experiment-station at Halle, that in this single item alone there was a saving to the farmers of the province of \$20,000 gold, and taking into account the increase in the other valuable constituents, phosphoric acid, potash, &c., as well as nitrogen, not only in guanos, but also in superphosphates, bone-dust, and other concentrated fertilizers, the saving must have amounted to many times this sum."

Low-grade and spurious fertilizers are detected if put upon the market in sections where control-systems are in vogue, or, to speak more accurately, are kept out of the market. Competition between different dealers comes to be based upon goodness of quality, and thus the standard is raised, and the wares become actually cheaper. Farmers buy fertilizers with confidence, and, in the light of the knowledge which comes to them from the experiments at the stations, coupled with their own experience, use them economically and profitably. And thus the agriculture, and with it the other industries and conditions of well-being in the districts where science is thus applied, are improved, and the whole community benefited.

#### INVESTIGATIONS OF SEEDS—THE SEED-CONTROL SYSTEM.

Of the many new ways in which science has, during the past few years, been applied to agriculture, one of the most interesting and useful is in the examination of seeds. In 1869, Dr. Nobbe, director at the station at Tharand, in Saxony, commenced the study of the seeds in common use in German agriculture, and founded the first "seed-control station." How much good has come from this may be inferred from the fact that during the seven years that have since intervened, over 4,000 samples of seeds have been examined at Tharand; that an astonishing amount of adulteration has been discovered, so much so as to exert a by no means inconsiderable effect upon the agriculture of the country; and that the importance of the work has come to be recognized so fully as to induce the establishment of a number of seed-control stations in Germany and other European countries. Various kinds of adulterations have been discovered. Sometimes these consist merely in seeds of weeds and other extraneous plants, either of inferior value or positively harmful, which have been gathered with the genuine seeds; sometimes they consist of inferior seeds purposely added to increase the bulk and weight of the wares sold. In some cases the seeds used for adulteration are deprived of vitality by previous steaming, roasting, or boiling; in others, so base are the practices to which the love of unlawful gain will stoop, not even this means is used to prevent the injury which must be brought upon the consumer by raising useless or noxious plants, instead of the useful ones he seeks. Genuine seeds which have lost their vitality by age are often mixed with fresh seeds. The most barefaced, though not the most harmful, seed-swindling discovered by Professor Nobbe, consists in grinding quartz rock, sifting out particles of the proper size, dyeing them in proper colors, and mixing them with clover-seeds. Samples of clover-seed containing 25 per cent. by weight of this admixture of colored grains of quartz can be

distinguished only by very close and careful examination from the unadulterated seed.

So patient, ingenious, and successful have been Dr. Nobbe's investigations, that he is able to distinguish with accuracy the seeds of the common cultivated plants and weeds, and to determine as well the percentages of pure seeds and adulterations, as what proportion of the genuine seeds are capable of germinating, and thus producing vigorous plants.

One outgrowth of Dr. Nobbe's work at Tharand, is his lately completed *Handbuch der Samenkunde*, a volume of 642 pages, of which 366 pages are devoted to the physiology of seeds, 138 to the means of determining their agricultural value, and the rest to the means of preventing frauds, and other topics.

Dr. Nobbe points with pride to the fact that at the time of the completion of this work there were already established in Germany some twenty seed-control stations, whose directors had almost without exception spent more or less time at the station at Tharand in preparing for their work, that still more stations were to be established in Germany, and that similar institutions were founded or proposed in Denmark, Austria, Hungary, Holland, Belgium, and Italy.

#### RESULTS OF WORK OF STATIONS—HOW MADE KNOWN AND APPLIED.

Those who are interested in the progress of agricultural science and the diffusion of agricultural knowledge, will find not only the organization and work of the experiment-stations, but also the ways in which their researches are made known and applied in practice worthy their careful study. An excellent indication of the state of affairs in this respect is found in the agricultural literature where the stations exist.

During the present year has appeared a work by Dr. Wolff, director of the station at Hohenheim, in Germany, entitled *Die Ernährung der landwirthschaftlichen Nutzthiere*. It is a royal-octavo volume of some 550 pages, and gives a "critical compilation of the results of the later investigations in animal physiology in their relation to the maintenance of domestic animals." It is, in fact, a compilation of the feeding experiments made (almost entirely in the German stations) since the year 1860. How great is the number of experiments whose details in part and results as a whole are herein described, may be inferred from the fact that, during the time specified, more than one thousand have been performed in which the digestibility of various food-materials by different animals has been tested, each one with a thoroughness that has never been so much as imitated on this side of the Atlantic. It is interesting, often amusing, but oftener sad to compare the vague discussions of some of even our most noted writers and talkers on cattle-feeding, with the close, patient, long-continued experimenting and carefully-attested conclusions on the same points which are given in this work.

But in order that the results of these researches may attain their greatest usefulness, they must be presented in a less abstract form—they must be explained in clear, brief terms, so that ordinary farmers may be able to read them understandingly and to apply the results to their daily practice with a fair hope of profit. Precisely this want has been met by Dr. Wolff in a little quarto volume of some 200 pages, in which the more important elementary principles concerning foods, nutrition, and feeding are explained in terms that any intelligent German farmer can readily comprehend. This volume tells just exactly what every man

who has stock to keep needs to know in order to feed most rationally and economically. A most excellent feature of the work is its price, which is only 2½ marks, or about 60 cents, gold.

Another and equally useful work by the same author bears the title *Praktische Düngerlehre*, and contains just such plain, definite, and practical information about fertilizers and manuring as the one just mentioned gives about foods and feeding. It is also a small quarto of 200 pages and is sold at the same price, 2½ marks. It speaks of air, water, and soils as sources of food for plants, and explains the general principles of vegetable nutrition, and then describes the various important fertilizing materials, their composition, value, and proper modes of application. If a farmer wants to know the characteristics of pure guano or bone, what they are composed of, how much phosphoric acid and nitrogen they ought to contain, and for what kinds of soils and crops and in what proportions they should be used, he has only to turn to the proper place in this book and learn. At the end he will find tables showing how much of the ingredients of plant-food are removed with different crops and supplied with different fertilizers, and other data which will enable him to keep account with his soil and see how the supply, by artificial means, keeps pace with the exhaustion in cropping. How useful the German farmers find this little book to be for them may be inferred from the fact that the sixth edition has been published and that the circulation has reached some 10,000 copies.

The spread and usefulness of this definite knowledge of the principles that lie at the basis of the right practice of farming is still better illustrated in the farmer's diaries in very common use among German farmers. One of these, bearing the title of "Mentzel and von Lengerke's Agricultural Calendar," is published annually in two parts, the one a pocket diary, the other for occasional reference, both together costing about 54 cents, gold. The amount of useful information and help in systematizing farm management which this little work contains is astonishing. The pocket volume furnishes a diary blank for every day in the year; tables for labor accounts; forms for registering yield of milk from each of sixty cows for each week of the year; seed and harvest tables; hay and forage tables; threshing tables; tables for entering all purchases, sales, and increase of livestock; tables for noting the destination of every kind of manure, and others for accounts of grist. Then come tables giving amounts by weight and measure of seed needed for a Prussian *morgen*, (about two-thirds of an acre,) either broadcast or in drills, for ninety-five different kinds and varieties of crops; amounts yielded per *morgen* of various crops, and so on. Then follow tables for calculating the exhaustion of soils by crops and enrichment by manures. These give the amounts of water, nitrogen, potash, soda, lime, magnesia, phosphoric acid, and so on, in not far from two hundred kinds of crops, and half as many kinds of manures, these latter being supplemented by tables for calculating how much stable manure will be produced per annum by a given number of animals; how to calculate the values of different commercial fertilizers from analyses, and so on. After these come still more elaborate fodder-tables, giving the chemical composition of nearly 250 different kinds of food for stock, with the amounts of digestible substances in each; the amounts of the digestible food-ingredients needed by different animals for dairy rations, and finally a long series of fodder-rations, or mixtures of the various foods in the proportions in which they should be fed to different animals, and for different purposes, in order to secure the most economical utilization of the nutritive material they contain. This diary is largely

circulated among the more intelligent German farmers. Another, which, is published at a price of 12½ cents, gold, serves to some extent the place in the house of the smaller German farmers that patent-medicine almanacs fill with us, save that instead of puffs for all sorts of concoctions, good, bad, and indifferent, they contain tables, simpler indeed than those in the other diary mentioned, but of the same general character. The circulation of this latter is stated at 100,000 per annum.

Whoever has had opportunity to observe the methods of farming in vogue in the countries where the experiment-stations exist, cannot fail to have been impressed with the intimate and necessary connection which exists between the thorough system and economy which prevails in the practice and the care taken to promote the science of agriculture.

The article by Professor Johnson from which I have already quoted, closes as follows:

To say that the farmers of Connecticut and of our entire country urgently need the aid and stimulus of the experiment-stations, is to make a most evident assertion. Our agricultural colleges have but few agricultural students. The reason lies mainly in the fact that our intellectual activity has the habit of running in other than agricultural channels. To bring our farmers in direct and profitable contact with the results of science, to bring science into active and visible coöperation with the toils and plans of the farm, would redound to the eminent advantage of both. The experiment-station, I cannot doubt, is to be this point of contact, the focus of this coöperation."

## FACTS FROM VARIOUS SOURCES.

GRASSHOPPERS.—Two correspondents, Messrs. J. B. McCullis and C. G. Boerner, living in Vevay, Indiana, inform the Department that on the 13th of November, 1876, an immense cloud of grasshoppers alighted in that place, literally covering the streets of the town. Mr. Boerner



observed, about 5 p. m., dense cumulo-stratus clouds in the southwest, gradually overspreading the sky. At 6 o'clock the wind had risen to moderate gusts, and within half an hour a rattling noise was heard against the windows, like that of light hail. On opening the doors grasshoppers entered in immense numbers, covering the floors, furniture, clothing, &c. The shower continued till 8 o'clock p. m., when the ground was thickly covered and the boys began to burn them, shoveling them into bonfires. Mr. B. supposed that he had identified both the *Caloptenus spretus* and the *C. femur-rubrum*, but the specimen sent shows the insect to have been the *Acridium (Cyrtacanthacris) americanum*, one of our largest American grasshoppers, and more than twice as large as either the *C. spretus* or *C. femur-rubrum*. [See figure.] They are not uncommon around Washington, but this is the first case on record of their appearance in such overwhelming numbers. Their habits are similar to those of other species, and when appearing during the growing season in such numerous

swarms, great damage to vegetation might be expected from them. They were too late in this case to inflict any very serious injury.

Grasshoppers, probably some species of the *Caloptenus*, have visited several counties in the Southwest. In Bandera, Bastrop, Bell, Cooke, Gillespie, Lavaca, Mason, Williamson, Kendall, Burleson, DeWitt, Robertson, Washington, Caldwell, Bexar, Waller, Victoria, and Grayson, Texas, they were very destructive upon gardens, meadows, and pastures. What little wheat was sown they destroyed, causing the sowing to be delayed till after their departure. In Williamson their damage to the cotton crop is estimated at 15 per cent. of an average yield. In Washington the grass on the cattle-ranges is destroyed to an extent that causes apprehensions that the cattle will starve. They appear to have a special relish for the foliage of peach and other fruit trees. They have deposited millions of eggs. These counties are scattered from the northern border to the Gulf of Mexico, but are all west of the nineteenth meridian of Washington. Two counties in Arkansas, Washington and Benton, report a similar destruction. Missouri also had a more or less severe visitation in Taney, Vernon, Nodaway, and Lawrence. Kansas was again raided by these pests, and many early-sown wheat and other cereal crops were destroyed, but their ravages were such as a spring-sowing will measurably repair. They have laid immense quantities of eggs, but our correspondent in Butler, after a careful examination, is satisfied that nine-tenths of the deposit are rotten. Our correspondent in Franklin, after a half-hour's search, found but a single healthy egg. The insects were also present in numerous swarms in Cherokee, Cowley, Neosho, Crawford, Shawnee, Douglas, Labette, Jackson, Jefferson, and Woodson. In Labette barley, peanuts, and hemp were not molested by them. In Richardson, Boone, and Cass, Nebraska, they were also destructive on newly-sown cereals, gardens, fruit-trees, &c., as also in Fremont, Rio Grande, and Douglas, Colorado.

The Hamilton (Iowa) Freeman states that a gentleman, on examining the ground on which the insects had deposited their eggs, found 52 deposits in 4 square inches, or 13 per inch. The eggs in each deposit varied between 17 and 34, averaging about 25 to the cocoon. If these all hatched, there would be 325 grasshoppers on each square inch. But most of the eggs were added by the warm weather subsequent to their deposit. It is proposed to destroy them by burning over the prairies. In Woodbury, Iowa, the insects greatly injured the potato crop.

Owsley, Kentucky, reports a great destruction of early-sown wheat by a grasshopper, which is most probably the *Caloptenus femur-rubrum*.

**IRON AND STEEL MANUFACTURES.**—The growth of the iron interest is in many ways subservient to advance in agriculture. In 1810 the product of pig-iron was but 54,000 tons; it more than doubled in ten years, and nearly doubled at each subsequent decennial period up to 1870, when it amounted to 1,865,000 tons, and reached 2,854,558 tons in 1872, since which time it has fallen to 2,266,581 tons in 1875. The decline was 422,832 tons from 1874. Less than one-fifth is charcoal iron, and of the remainder the bituminous slightly exceeds the anthracite.

The importation of pig-iron has nearly ceased; it was but 66,457 tons last year, and the *exports* were 8,738 tons; and with an increased domestic product in ten years, from 931,582 tons in 1865 to 2,266,581 in 1875, the price has declined from 58½ cents per pound to 25¾, which is less than the price in 1845.

The States reporting more or less increase over 1874 are Maine, Virginia, Georgia, Indiana, Illinois, and Wisconsin. The States producing the larger proportions were Pennsylvania, 42.4 per cent.; Ohio, 18.3;

New York, 11.7; Michigan, 5; New Jersey, 2.8; Wisconsin, 2.7; Missouri, 2.6; Illinois, 2.2; Kentucky, 2.1; Maryland, 1.7.

The product of rolled iron was 1,890,379 tons, an increase since 1874. There was also an increase in rails from 727,413 to 792,512 tons.

**RUSSIAN APPLES.**—Several years ago the Department of Agriculture imported a collection of apple-trees from St. Petersburg. These were planted in the grounds of the Department with a view to procure and disseminate grafts for the purpose of testing their adaptability in various sections and localities, especially in the Northern and Northwestern States.

Many thousands of these grafts have been distributed, and the Department has received returns relative to their hardiness, and other particulars concerning their adaptability and value, but only from a few of the many correspondents receiving them.

Full particulars regarding their hardiness, and especially their general adaptability to rigorous climates, would be of great value, and the Department is desirous of being placed in possession of such information as may lead to an estimate of their worth.

**ADVANTAGE OF HOME-PRODUCTION.**—Our correspondent in Logan, Kentucky, reports that much of the aftermath of an extra fine clover crop in that county was saved for seed; enough to furnish employment for two clover-seed hullers. He estimates that a sufficient quantity has been saved to supply the farmers next spring, and that this will save within the county \$28,000 to \$30,000, the amount heretofore annually paid out for clover-seed.

**PROLIFIC BEANS.**—Mr. Silas M. Blanchard, of Hudson, Hillsborough County, New Hampshire, from 5 pints of pea-beans harvested 3 bushels and 18 quarts. One stalk produced 130 pods, containing 615 seed.

**ALFALFA IN CALIFORNIA.**—General Bidwell, of Chico, will seed 2,000 acres in this forage-plant, and other farmers will seed still larger acreages. It is estimated that the total breadth seeded will be from 35,000 to 40,000 acres.

**WINE FROM MISSION GRAPES.**—A correspondent of the San Francisco Morning Call remarks that the Mission grape in California makes a strong claret, while on the alluvial bottoms of the Rio Grande it yields a strong rich wine more resembling port. In the northern mountainous regions of Spain the same vines yield a deep-colored alcoholic wine considerably resembling that of California. These Spanish wines are shipped largely to France in order to be manipulated into light French claret. In California the Mission wine is largely manufactured into claret by the foreign population of San Francisco, as its high alcoholic strength will admit of free watering. The popularity of the Mission grape is rapidly waning. Even first-class wine-makers have failed to make a superior wine or brandy from it, and several have begun to graft the Mission stocks with better varieties. The writer predicts that if all the Mission vines were thus treated the character of California wines would rise 500 per cent. in the public estimation. If the Mission vines were grafted out, he says that very little poor wine would be made in the State.

**CALIFORNIA RAISINS.**—In 1876 the raisin-growers of California about trebled their product of the previous year. The receipts at San Francisco by the close of this year will probably have reached 60,000 boxes, against 18,000 or 20,000 last year. It is stated that one vineyard dried 240 tons of grapes, producing 80 tons of raisins. This is a specimen of the extent of this new productive interest. The dry summers of Cali-

fornia, and the regular and limited period of her annual rain-fall, give special facilities for drying in the sun. Grapes dried in this way produce much finer raisins than those dried by artificial heat. The grape-growers of California also exhibit great ingenuity in shielding their grapes against occasional and unexpected showers; frames are provided for the spreading of the fruit and are arranged for convenient handling and turning, so that all sides of the bunches may be consecutively exposed to the heat. On the approach of rain the frames may be speedily placed under cover, and when dry weather re-appears may again be spread out.

**EXPORT OF AMERICAN BEEF AND MUTTON.**—Six steamers of the Anchor line have been provided with refrigerating apparatus for the transport of fresh meat across the Atlantic. Cattle are brought by rail to the seaboard and killed the night before they are shipped. A current of cool air, driven by steam-power and kept up all night, sets the beef and extracts the animal heat. Carcasses are then cut in quarters and placed in the refrigerating compartments of the vessels. These are hermetically sealed, and kept cool by masses of ice in the next rooms. Air circulates between the meat-rooms and the ice-rooms by means of tubes and a pumping-engine. The temperature is kept down to 38°. A reduction to the freezing-point would greatly injure the flavor of the meat. The transportation of live cattle cannot be maintained in competition with the dead-meat trade, which is enlarging rapidly. Arrangements have been made to ship 200 carcasses per week to Glasgow alone. In cold weather the number will probably be increased. This is but a specimen of what may be expected of this dead-meat trade, which is yet but in its infancy.

**STATISTICS OF NEW MEXICO.**—A pamphlet issued by the New Mexico Stock and Agricultural Association states the area of the Territory at 77,568,640 acres, of which about 9,000,000 are claimed under private grants. Up to 1876, 6,148,463 acres had been entirely surveyed, besides 189,485 acres of military reserves, 1,752,960 acres Indian reserves, 4,377,750 acres of private grants, and 705 acres of mines and town-sites; total, 12,469,363 acres. Of the surveyed lands the amount technically called "offered land," is 1,630,735 acres. These are lands that have remained unsold, after having been offered at public auction. Of these, about 65,000 acres have been purchased or entered under the homestead and pre-emption laws. The residue are now open to appropriation by private entry, at \$1.25 for ordinary lands and at \$2.50 for lands within the limits of railroad-grants. Two roads have been subsidized—the Texas Pacific and the Atlantic and Pacific. A large area of confirmed private grants is ready for purchase from the grantees.

The Territory contains from 18,000,000 to 20,000,000 acres of arable land capable, with irrigation, of high cultivation. The irrigating facilities are ample, water abundant, and located on appropriate levels. The mountain country presents a large number of natural basins for the accumulation of winter and spring rains, and of water from melting mountain-snows in the summer. The soils of the lowlands are generally a rich sandy loam, composed of disintegrated rocks and volcanic ashes. Corn, wheat, oats, and barley grow well in all parts of the Territory, especially in the northern region. Corn, in the rich bottoms, with no careful culture, yields as high as 80 bushels per acre. Near Santa Fé are lands that have been in cultivation for two hundred years, without an ounce of fertilizers, and yet their productive capacity seems scarcely impaired. The Rio Grande del Norte Valley has a length, in

the Territory, of 500 miles, averaging 5 miles in breadth. Its waters, like those of the Nile, contain a rich sediment, amounting to 20 per cent., by weight, of the whole. But little engineering enterprise is necessary to render its waters subservient to irrigation. Such irrigation is equivalent to a heavy deposit of organic manures. El Paso Valley has been cultivated for two hundred and sixty-five years.

Grape-culture finds very favorable conditions, especially warm, dry summers for the elaboration of the fruit, while the frosts of winter are only sufficient to kill a number of noxious insects. All sorts of vegetables grow finely, and the temperate and subtropical fruits are generally successful in different parts of the Territory. Not one-tenth of the valleys of Rio Grande and Pecos is yet occupied, although the settlements are chiefly confined to these and a few other valleys. The Mesilla Valley, 70 miles long, has land enough for 560 farms, of 320 acres each, of admirable fertility. Farmers who settled there ten years ago without any capital are worth \$50,000 to \$60,000 to-day. Its temperature is genial and its atmosphere salubrious. The Rio San Juan region, 90 miles by 60, embraces a vast area of excellent land, and is now attracting the attention of settlers. This region lies about 100 miles northwest of Santa Fé.

The population, at the close of 1874, was 121,250; it is estimated, in 1876, at 135,000. This population embraces 7,648 Pueblo Indians, a peaceful, honest, law-abiding people, owning and working farms according to civilized laws. Their lands were ceded them in 1546 by the Emperor Charles V.

Vital statistics, especially those of the last two United States Census Reports, show that New Mexico returns the lowest death-rate from tubercular disease of any State or Territory in the United States. Bronchitis is scarcely known, while many cases of tubercular consumption are known to have been cured by residence in the Territory even after considerable lung cavities have been produced. There is a marked absence of malarial affections, but for rheumatism and other diseases of the heart the climate cannot be recommended, as it tends to enhance valvular difficulties. For general debility and nervous prostration it is claimed that no more perfect sanitarium exists on this continent.

Manufacturing facilities are excellent, though almost totally undeveloped. Anthracite and bituminous coals have been found in immense masses, while deposits of iron-ore are abundant and rich. Materials for the manufacture of leather are also abundant. The public school system has been thoroughly organized.

Stock-raising seems destined to be the great productive industry of the Territory. An immense area of pastoral lands, covered with nutritious and abundant grasses, awaits occupation. The grama and mesquite grasses are especially valuable, as a natural process of curing in the dry season renders them available for winter-feeding. All kinds of stock thrive upon this diet, and cattle become almost as fat as if stalled. Merino sheep were introduced from Spain three hundred and thirty-six years ago and have grown with very little effort at improvement. Yet, though they have degenerated in size and quality of fleeces, their mutton is excellent. Judicious crosses have been made with encouraging results. The increase of lambs amounts to about 100 per cent. of the number of ewes. A flock of 5,000 ewes and 100 rams may be expected in one year to amount to 10,100, of which 7,500 will be ewes and 2,600 rams and wethers, the increase being nearly equally divided between the sexes. The wool-clip from the 5,000 sheep, at  $1\frac{1}{2}$  pounds per head, amounts to 7,650 pounds, which at 22 cents a pound brings \$1,683 for the wool.

clip of the first year alone. The expense of keep is estimated at \$765, leaving \$918 for investment in 50 high-grade rams. The second year, then, will open with 7,500 ewes and 2,650 rams. If the former again double there are 15,000 sheep at the end of the second year, of which 11,250 will be ewes and 6,400 rams and wethers. Of these 10,150 will shear about 3 pounds per head, or 30,450 pounds of improved quality, which at 28 cents per pound bring \$8,526. At this point 2,500 yearling wethers may be sold for enough to purchase 1,600 ewes and 100 rams. This will give at the commencement of the third year 12,850 ewes and 4,000 rams and wethers, or 16,850 sheep in all. By converting wethers into valuable rams and ewes the process may be continued, if judicious regard be had to all the circumstances. Another element of profit is found in the fact that the fleece improves in price in proportion as it increases in weight. These figures are said to be indications of what has been successfully achieved in New Mexico. The Angora goat will do as well here as in any part of the world. The native Mexicans employ the ass and common goat, the former for transportation and the latter for milk and cheese. Horses and cattle would do as well as sheep.

The agricultural interest will also find a home market when the immense mining facilities of New Mexico are fully developed. Gold and silver deposits, both placer and vein mines, are extensive and valuable. Copper and brown hematite iron are inviting extended and profitable working. Salt occurs in beds and in lakes in different parts of the Territory. Timber is mostly confined to the mountain districts and high rolling lands. Pitch, yellow and spruce pine, cottonwood, walnut, locust, box-alder, and sugar-tree fringe the streams and cañons of the mountains. A small species of live-oak and a peculiar kind of cedar, called juniper, grow well on the southern uplands. The nut-pine or piñon is abundant and makes excellent fuel.

**SHEEP-RAISING, OREGON.**—Mr. W. T. Newby, of Yamhill County, Oregon, in response to a letter of the Commissioner, gives the following statistics regarding sheep-husbandry in his State. The State census of 1875 gave the number of sheep at 539,600, which evidently included lambs. The aggregate wool-product was 1,863,002 pounds.

The breeds represented range all the way from the poorest to the very best of the highly improved varieties. Thorough-bred merinos are of Spanish, French, American, and Australian origin, but Mr. Newby thinks that none except the Spanish are thorough-bred, the others being really but grades of that stock. All varieties of the merino are well adapted to the climate and circumstances of Oregon. Spanish rams range from 16 to 30 pounds per head of unwashed wool; but a ram that does not shear over 20 or 25 pounds is not considered of much value. Spanish ewes range from 10 to 18 pounds. This breed is suited to large flocks, and are supposed to be healthier and more cheaply fed than any other. They are not so good mutton-sheep as the other varieties, yet they are fair in this respect, and will average from 45 to 55 pounds per carcass when dressed. But as wool-producers Mr. Newby thinks the Spanish merinos have no equal. They are short, well formed, of excellent condition, and longer lived than other varieties. With fair treatment they also carry their wool longer, seldom losing a lock of wool from one shearing time to another; they sometimes carry their fleeces two or three years without shearing.

French merinoes are becoming unpopular and disappearing from the flocks. They are too flat and "legged," and of feeble constitution. Their fleeces are uneven, some parts being fine and others coarse. At three years of age the wool becomes harsh and dry, the lubricating oil

being saturated with yellow gum of the consistency of bee-bread. They are less desirable for cross-breeding and shorter lived than the Spanish.

The American merino is a good sheep, with moderately fine form, yielding good medium wool, at the rate of five to ten pounds per fleece.

The Australian merino has decreased in numbers in the last seven or eight years. It is of good form, though small, and yields from four to six pounds per fleece of very fine, even wool. It is well adapted to running in large flocks; but the lambs are tender, and need care when dropped. These sheep were introduced in 1857 or 1858, by a Mr. Thompson, who bought 36 head on an Australian vessel in San Francisco; crossing them with other merinos, especially with the Spanish, increased the weight of the fleece; but crosses with common sheep soon proved unprofitable. A sample of the fleece of a yearling ram, the offspring of this flock, is still preserved, the fiber being 11 inches long. Their carcass is small, but the mutton and wool are both fine.

Cotswolds were imported over twenty years ago, and were very popular for ten or fifteen years; but when the native grasses became short, and flocks had increased from 50 to 1,000 head, these sheep became less profitable, and are going out of use. They are still of value in small flocks, where mutton is in good demand at high prices, and where food is abundant and of good quality.

The Leicesters were imported about 1860, by Mr. A. McKinley, a Scotch gentleman, who had previously been in the service of the Hudson Bay Company. Another variety, called the New Oxford, is but little known, but is spoken of as superior for the production of combing-wool.

Fifteen years ago the Southdowns were very common; but their light fleeces have rendered them unpopular, and they are falling into neglect. A slight cross of the Southdown blood on other varieties is beneficial, improving the form, action, and hardiness of the resultant breed. They were imported from England by the Hudson Bay Company about twenty-five years ago.

In 1843 the Hudson Bay Company had a large flock of Spanish and Mexican sheep, of very small frames, shearing from one-half to one and a half pounds per head, and dressing but twenty-five to thirty-five pounds per carcass. A flock of 50 common sheep was brought across the plains from Missouri, by Mr. E. M. Adams, in 1847, and about the same time a flock of 75 was brought by a Mr. Shaw. These were the only sheep at that time in Oregon, including, as it then did, Washington Territory. The crossing of these flocks constituted what are termed the common breed of the country, which average from three to six pounds per fleece, and dress about fifty pounds per carcass. These sheep, if not too deeply crossed with Leicester or Cotswold, produce wool a little below medium, and excellent mutton. They do well in large flocks.

Mr. Newby estimates the average cost per annum of keeping sheep in Oregon at not over 50 cents per head, though there is a wide range of difference. East of the Cascade Mountains, where the great mass of the sheep are kept, many flocks get through the winter on the abundant and nutritious bunch-grass; but this is in localities where the snow-fall is light. A shepherd is there employed for every 1,000 head, at a salary of about \$300 per annum. Sometimes hay, to the extent of 40 tons per 1,000 head, is provided, at the cost of \$5, per ton; but frequently not over half the hay is used.

In the Willamette Valley flocks range from twenty-five to three hundred head, some reaching as high as two thousand or three thousand. The cost here varies from about nothing to seventy-five cents per head.

Even in the latter case, the fertilizing value of the droppings exceed the cost of the maintenance.

The wool-product shown by the State census of 1875, divided by the number of sheep, gives an average product of 3.45 pounds per head; but as lambs unshorn were largely counted among the animals, the average is too low. It should probably be 5 pounds per head. The annual increase from droppings of lambs is about 90 per cent.

The number of acres necessary to pasture 100 sheep varies in different localities and with different kinds of sheep, Cotswolds and Leicesters requiring more than merinos. The merinos might be kept on 1 acre per head; the others would require  $1\frac{1}{2}$  acres. For fleeces ranging from thoroughbred to one-fourth merino, Mr. Newby received, in 1874, from 25 to 30 cents per pound; in 1875, 25 cents per pound, averaging the whole. His neighbors got from 21 to 23 cents per pound. These prices are for unwashed wool. No wool is washed in Oregon.

Sheep here are generally healthy, but some prevalent forms of chronic distemper are noted. The scab results from bad management. The malady is easily cured by dipping in a decoction of tobacco mixed with blue vitriol and lime. No other chronic complaint is of sufficient importance to provoke attention; but Mr. Newby describes a new malady, which has become quite prevalent in some localities, for which he finds neither name nor description in works on sheep-husbandry. The premonitory symptoms are a dry cough, with swelling lips. The swelling continues for 2 or 3 weeks, and, if fatal, enlarges the lips 2 or 3 inches, turning them perfectly black and producing a very offensive odor, with a very repulsive appearance. A putrid state of the whole carcase necessitates great determination to complete a post-mortem examination. A free administration of tar is recommended. The appetite does not fail to the last. For lack of a more definitely known cause, Mr. Newby suggests that the disease may result from extreme short pasture on fallow lands, the animals absorbing a large amount of dust.

Mr. Newby concludes that sheep-raising has proved profitable. A man with 150 acres can raise from 200 to 500 bushels per annum more of wheat if he keeps sheep than without them. Add this to the wool and product, and he thinks there is a very substantial element of profit in the business. Sheep-raising is a far better policy than the summer fallowing of partially worn-out lands. The grain farmers are finding this out, and are importing Cotswolds and other mutton-sheep. Wool-production is rapidly increasing in Oregon, which promises soon to take the front rank in the business.

**CALIFORNIA STATISTICS.**—The returns of county assessors show 2,156,149 acres in wheat in California in 1874, producing 30,248,000 bushels; 490,274 acres in barley, producing 9,261,940 bushels; 65,217 acres in oats and 40,922 acres in maize, producing, together, 3,122,000 bushels; 586,705 acres in hay, producing 752,214 tons. Smaller areas were sown in rye, buckwheat, pease, flax, hops, tobacco, cotton, &c. Los Angeles County raised a third of the corn-crop.

The live-stock embraced 1,385,877 cattle, 5,464,711 sheep, 242,819 hogs, 230,622 horses, 22,257 mules, 837 asses, and 44,426 Angora goats. The wool-product had doubled within five years, amounting to 43,532,223 pounds, of which 22,746,730 pounds were spring-clip, 19,225,493 fall-clip, and 1,560,000 pulled wool. The wool shipped during the year amounted to 43,183,000 pounds, a large portion of which was Oregon wool; 3,612,206 pounds were consumed by the woolen mills of the State.

Of wine, 7,000,000 gallons were made in 1875, the quality being re-

ported as inferior to that of 1874, especially in red wines. Inferior brands are in excess of the demand of the market, and a large stock of the three previous years is left over. Mission-grape wines are delivered on board ship for 50 cents per gallon, while higher-class wines reach 80 cents or \$1. A large quantity of grapes is made into raisins by the Alden process, which has been found very successful.

Sheep-farming by its old methods has about reached its limit. Sheep ranches are now too valuable for this branch of production, and it is difficult to secure a large run. Sheep are driven in large flocks into New Mexico and Colorado. The alfalfa or lucern grass is a new element in the problem of sheep-raising, which promises to overcome the most important difficulties with which this industry has to contend.

The influx of population is steady and an addition of 60,000 is expected during 1876. This immigration has created a considerable demand for home-produce, and especially has kept the flouring-mills busy at remunerative prices.

**BRAZILIAN STATISTICS.**—The first regular census of the Brazilian Empire was completed several months ago, and the tables officially published July 31, 1876. These show the total population to be 11,441,284, of whom 9,930,478 are free and 1,510,806 slaves. The free population includes 243,481 foreigners. As the territory of the empire includes 3,856,000 square miles, an equal distribution would not allow three persons to each square mile. As the population is mostly gathered in a few localities, immense regions of unoccupied territory are found in all parts of the empire. A considerable population in these wastes were too isolated for the census-takers, and hence a small addition may be made by estimate to the aggregate reported in the tables. The population in 1820 was estimated at 3,500,000, and at the accession of the present enlightened emperor, in 1831, at 5,000,000. Immigration has never been very large, and hence the natural increase must have been extraordinary to triple the population in a little over half a century. This is one of the most remarkable facts in the history of race development, especially in view of the destructive visitations of yellow fever, small-pox, and other epidemics operating in the leading centers of population on the coast. The late war with Paraguay reduced the population at least 100,000, including lives lost and slaves escaped.

The facts in regard to sex have been very imperfectly ascertained. Of the free population 4,318,699 are males and 4,100,973 females, leaving 1,510,806 whose sex is not stated—probably children under the age of puberty, which arrives very early in the southern European races that peopled South America. These figures show about 105 males to each 100 females. Of the males 2,975,446, or 69 per cent., are single; 1,165,866, or 27 per cent., are married; 177,387, or about 4 per cent., are widowers. Of the females, 2,752,582, or 67 per cent. are unmarried; 1,121,000, or 27½ per cent., are married, and 127,391, or 5½ per cent., are widows. Of the male slaves 711,869 are reported as single, 73,079 as married, and 20,222 as widowers. Of the female slaves 622,804 are reported as single, 63,010 as married, and 19,816 as widows. This enormous disproportion indicates a very low social morality among the slave population.

The census-tables embrace 15,848 blind, 11,595 deaf-mute, 40,869 crippled, and 15,309 idiotic and insane individuals. The Indians inhabiting the unoccupied Brazilian territories exhibit few, if any, cases of these infirmities. The Brazilian civilized population, however, embraces an unusual number of individuals over one hundred years of age, a few in

the interior being reported as one hundred and forty and one hundred and fifty years old; only a third of the free males over sixteen, and a fifth of the free females are able to read. Very few slaves have this measure of culture. Of the 1,902,454 individuals between six and fifteen years of age (941,782 boys and 960,672 girls) only 155,651, or  $16\frac{1}{2}$  per cent. of the boys, and 165,098, or  $17\frac{1}{2}$  per cent., of the girls attend school; that is about 84 per cent. of the children of the appropriate school-age, are not furnished with facilities for education. The publication of these statistics has produced a profound sensation throughout the empire.

**AGRICULTURAL STATISTICS OF URUGUAY.**—A descriptive work by General Reyes states the total area of the republic of Uruguay at 46,189,804 acres, or somewhat less than that of Nebraska. Of this area 32,499,693 acres, or nearly three fourths of the whole, are occupied by cropping or grazing. The land in crops is but 2.68 per cent. of the area actually occupied. Pastoral husbandry, then, has over 31,000,000 acres for the support of 6,327,500 cattle, 554,726 horses, 6,437 mules, 13,005,244 sheep, and 400,000 or 500,000 hogs and goats. The total value of these animals is about \$30,000,000. The total value of pastoral and cultivated lands, \$70,800,000. Adding \$123,400,000 on for structures of all kinds and \$6,000,000 for unenumerated property, the total of these items is \$2,352,000,000.

**BRITISH AGRICULTURAL RETURNS.**—The official returns just issued show, during 1876, a total acreage in Great Britain under all kinds of crops, bare, fallow, and grass, of 31,546,949 acres, an increase of 130,599 acres, or 0.4 per cent., over 1876. England returns 24,194,091 acres, an increase of 81,782; Wales, 2,712,097 acres, an increase of 15,954; Scotland, 4,640,761 acres, an increase of 32,863. The total acreage under cereals was 9,184,769 acres, a decrease of 266,881, or nearly 3 per cent.; England, 7,278,286, a decrease of 250,257; Wales, 493,968, a decrease of 13,210; Scotland, 1,407,515, a decrease of 3,414. The total acreage in wheat, 2,994,957 acres, a decline of 347,524 acres, or nearly  $10\frac{1}{2}$  per cent.; barley and bere, 2,533,109 acres, an increase of 23,408; oats, 2,789,530 acres, an increase of 125,521; rye, 56,210 acres, an increase of 1,307; beans, 517,556, a decrease of 46,625; pease, 293,407, a decrease of 22,968. England has 94 per cent. of the wheat acreage, losing nearly 10 per cent. from 1875; about 6 per cent. of the acreage is assigned to Wales and Scotland, the proportion of the former being a little the greater; both show a considerable decline from last year. Of the acreage in barley and bere, England has about 83 per cent.; Wales, 6 per cent., and Scotland 11 per cent.; it increased in England and Scotland, but fell off in Wales. England has about 55 per cent. of the acreage in oats; Wales, 9 per cent., and Scotland 36 per cent., all showing increase. England reports 81 per cent. of the rye acreage; Wales 3 per cent., and Scotland 16 per cent. England has 94 per cent. of the acreage in beans; Wales, 1 per cent., and Scotland 5 per cent. England has 98 per cent. of the acreage in pease, and Wales more than half of the remainder.

Under green crops, 3,577,111 acres are reported, falling short of 1875, 86,996 acres, or about  $2\frac{1}{2}$  per cent.; England fell from 2,848,473 acres to 2,754,803; Wales from 131,085 to 129,466; Scotland rose from 634,549 to 692,842. Potatoes declined from 522,653 acres in 1875 to 505,088 in 1876; England had 60 per cent.; Wales, 8 per cent.; Scotland, 32 per cent. Turnips and swedes covered 2,148,441 acres, an increase of 5,743; England had 73 per cent. of this acreage; Wales, 3 per cent.; and Scotland, 24 per cent. The acreage in mangel fell from

361,617, in 1875, to 347,889 in 1876, nearly the whole being in England. Carrots occupied 16,129 acres, an increase of 1,193, seven-eighths of the acreage being in England. Cabbage, kohlrabi, and rape were returned at 179,475 acres, a reduction of 10,258; nearly the whole was in England. Vetches, lucerne, and other green crops, not including clover or grass, fell from 432,470 acres in 1875 to 380,089 acres in 1876; England, 359,759 acres; Wales, 5,851; Scotland, 14,476.

The flax-crop rose from 6,751 acres to 7,641, nearly the whole being in England. Under hops, England had 69,999 acres against 69,171 in 1875; none reported in either Wales or Scotland. The bare fallow rose from 557,979 acres to 651,212 acres, England having all but 43,307. The grass acreage under rotation was 4,540,273 acres, an increase of 186,202, a little less than half being devoted to hay production; of this area about 61 per cent. is in England, 30 per cent. in Scotland, and 9 per cent. in Wales. In permanent pastures, meadows or grass, not in rotation, (excluding heath or mountain land,) the reported acreage is 13,515,944 acres, an increase of 203,323; 10,688,629 are in England; 1,697,946 in Wales, and 1,129,369 in Scotland.

Of farm-animals, horses have increased from 1,340,129, in 1875, to 1,374,576, in 1876, England having 1,057,545; Wales, 128,363, and Scotland, 188,668; about 70 per cent. are used solely for agriculture. The total number of cattle was 5,847,802, a decrease of 165,022; this includes 2,227,867 cows and heifers in milk or with calf; of the cattle, other than cows, about 57 per cent. are under two years old. The total number of cows fell off during the year, 25,374; England has 1,573,656; Wales, 259,462; Scotland, 394,749. The total number of sheep was 28,172,951, a reduction of 994,487; about two-thirds are over a year old; England reports 18,320,091; Wales, 2,863,141; Scotland, 6,989,719, all three showing a reduction in their numbers. Swine increased from 2,229,918 to 2,293,620, all sections showing increase; England reports 1,924,033; Wales, 215,488; Scotland, 154,099.

AGRICULTURAL STATISTICS OF IRELAND.—Official returns show the total acreage in Ireland under crops of all kinds during 1876 to have been 5,206,053 acres, or 126,170 less than in 1875, and 63,519 less than in 1874. The total area in cereals was 1,848,487 acres, viz: wheat 119,357, a decline of 39,398; oats 1,487,086, a decline of 14,781; barley 220,662; a decline of 13,241; bere and rye, 9,232, a loss of 1,098; beans and pease 11,910, an increase of 197; net decrease, 68,321 acres. The acreage in flax was 132,878, an increase of 31,704. The area in green crops was 1,363,224 acres, viz: potatoes 880,693, a decline of 19,893; turnips, 344,721, an increase of 12,183; mangel-wurzel and beet-roots, 48,631, an increase of 5,407; cabbage, 33,546, falling off, 1,400; carrots, parsnips, &c., 36,026, losing 1,103; vetches and rape, 19,607, a decline of 2,125; net loss of green crops, 6,931 acres. The area in meadow and clover was 1,861,464 acres, a decline of 83,212.

The decline in general acreage under crops is shown in each of the four provinces of Ireland. The area in grass, not including meadow or clover, was 10,507,249, or 97,920 more than in 1875, all the provinces except Ulster showing an increase. Fallow lands occupied 11,652 acres, or 788 more than in 1875, the increase in Munster and Ulster more than counterbalancing the decrease in Leinster and Connaught. Woods and plantations were returned at 324,028 acres, an increase of 5,363, which was distributed through all the provinces. Bog and waste lands amounted to 4,278,214 acres, an increase of 22,689; Leinster and Ulster showing an enlargement and Munster and Connaught a falling off. The total agricultural area is given at 20,327,196 acres.

Of cereals, the wheat acreage shows a steady decline during each of the last six years, having fallen from 244,541 acres in 1871 to 119,597 in 1876. The oats acreage is about what it was in 1871, having been considerably larger in some of the intermediate years. Barley, bere, rye, beans, and pease have about held their own. Of green crops, potatoes, with some fluctuation, have shown a declining tendency, having fallen from 1,058,431 acres in 1871 to 880,693 in 1876. Turnips, mangel, beet-root, carrots, parsnips, &c., have steadily enlarged their acreage, while vetches and rape have fallen off. The area in flax is larger than any year of the last five, having gradually declined, till in 1875 it amounted to but 101,174 acres. The acreage in meadow and clover is larger than in 1871, but less than in 1874 and 1875.

Of farm-animals, horses and mules numbered 556,630, an increase of 8,511; the aggregate of 1876 was only exceeded by that of 1872, 560,804, during the last ten years. Asses numbered 182,614, an increase of 2,259 over 1875, and the largest annual aggregate for ten years. During the last decade the number of cattle increased from 3,707,803 in 1867 to 4,147,102 in 1873, declining in the subsequent years to 4,113,693 in 1876, a loss of 1,595 compared with 1875. Sheep have steadily declined; the greatest aggregate of the past ten years was 4,901,496 in 1868, and the smallest 4,007,518 in 1876, a decrease of 246,509 from 1875. The aggregates of swine have greatly fluctuated during ten years, ranging from 869,578 in 1868 to 1,621,423 in 1871; in 1876 the returns showed 1,424,143, an increase of 172,087 over 1875. The number of goats regularly increased from 190,429 in 1867 to 270,691 in 1875, and then fell off to 264,246 in 1876. Poultry shows a uniform annual increase from 10,334,309 in 1867 to 13,582,782 in 1876, an increase of 1,443,644 compared with 1875.

**THE ENGLISH HOP TRADE.**—A correspondent of the Mark Lane Express estimates the English production as follows: Mid Kent district, 17,000 acres and 119,000 cwt.; East Kent, 12,000 acres and 78,000 cwt.; West and North Kent, 4,000 acres and 12,000 cwt.; Weald of Kent, 10,000 acres and 60,000 cwt.; Sussex, 11,000 acres and 55,000 cwt.; Worcester and Hereford, 9,000 acres and 13,500 cwt.; Surrey and Hants, 5,500 acres and 33,000 cwt. The total area is given at 68,500 acres, and the aggregate product 370,500 cwt., or 5.41 cwt. per acre. The writer quotes a recent circular of a leading firm of brewers, stating that crops on the continent are everywhere short; in Bohemia, especially, there is a general failure. An average crop on the whole continent would produce from 1,000,000 to 1,200,000 cwt., whereas the actual yield is supposed not to exceed from 260,000 to 300,000 cwt., while the actual consumption is between 550,000 and 600,000 cwt., and the stock remaining over is supposed to be between 150,000 and 180,000 cwt. In England old stocks are remarkably low.

BRITISH FLOUR AND GRAIN IMPORTS.—The returns of the board of trade show the following imports of flour, meal, and grain for the first ten months, respectively, of 1875 and 1876:

	Quantity.		Value.	
	1875.	1876.	1875.	1876.
Wheat from Russia.....cwt.....	8,143,034	6,611,977	£4,174,025	£3,261,708
Denmark.....do.....	339,150	260,260	184,020	145,343
Germany.....do.....	4,602,944	2,037,874	2,563,564	1,163,902
France.....do.....	944,060	236,200	506,152	128,217
Turkey, including Roumania.....do.....	703,446	1,177,555	336,069	538,434
Egypt.....do.....	1,357,061	1,932,683	681,745	818,461
United States.....do.....	20,462,736	17,033,575	10,774,772	9,044,677
Chili.....do.....	630,376	939,364	348,103	488,060
British India.....do.....	720,040	2,387,551	363,018	1,184,194
British North America.....do.....	2,870,458	2,029,586	1,554,609	1,081,961
Other countries.....do.....	1,111,631	3,150,717	637,360	1,762,961
Total wheat.....do.....	41,884,936	37,797,342	22,123,437	19,617,918
Barley.....do.....	8,675,124	6,755,628	3,640,361	2,633,233
Oats.....do.....	10,646,459	9,359,957	4,649,052	3,861,944
Pease.....do.....	1,210,048	1,202,471	558,653	530,193
Beans.....do.....	2,760,341	3,886,227	1,249,176	1,558,824
Maize.....do.....	17,658,700	35,343,867	7,075,266	11,222,369
Total grain.....do.....	82,835,608	94,345,492	39,295,945	39,524,481
Wheat meal and flour from Germany.....do.....	604,820	736,703	486,875	603,565
France.....do.....	1,457,659	870,719	1,136,904	705,275
United States.....do.....	1,885,228	2,010,156	1,429,462	1,462,687
British N. America, do.....	244,480	712,999	178,906	153,064
Other countries.....do.....	644,391	1,083,010	607,689	942,298
Total flour and meal.....do.....	4,836,578	4,918,587	3,839,836	3,866,889
Indian meal, including maizena.....do.....	6,252	6,361	9,470	13,324
Total grain, flour and meal.....do.....	87,678,438	99,270,440	43,145,251	43,404,694

The above table shows that the total import, including grain, flour and meal, increased 13.2 per cent. in quantity, and 0.6 per cent. in value. Unmanufactured grain increased 14 per cent. in quantity, and 0.5 per cent. in value. The wheat import fell off  $9\frac{3}{4}$  per cent. in quantity and  $11\frac{1}{2}$  per cent. in value. The wheat import from the United States declined  $16\frac{3}{4}$  per cent. in quantity and 16 per cent. in value; that of Russia, 19 per cent. in quantity and 22 per cent. in value; that of Germany, 56 per cent. in quantity and 55 per cent. in value; that of British North America, 29 per cent. in quantity and 30 per cent. in value; France, about 75 per cent. in quantity and value; Denmark, 23 per cent. in quantity and 21 per cent. in value. The other countries increased their import, viz: Turkey, 67 per cent. in quantity and 60 per cent. in value; Egypt, 42 per cent. in quantity and 20 per cent. in value; Chili, 49 per cent. in quantity and 40 per cent. in value; British India, 231 per cent. in quantity and 226 per cent. in value; countries unenumerated, 183 per cent. in quantity and 177 per cent. in value. These facts show a tendency to purchase cheaper wheats and to enlarge trade with countries with which the United Kingdom has had but medium relations hitherto. All the great wheat countries supplying the British market have curtailed their contributions. The United States, the largest contributor, furnished 45 per cent. in quantity and 46 per cent. in value in 1876, against 50 and 49 per cent. in 1875; Russia fell from  $19\frac{1}{2}$  to  $17\frac{1}{2}$  per cent. in quantity and from 19 to 16 per cent. in value; Germany fell from 11 per cent. in quantity and  $11\frac{1}{2}$  per cent. in value to  $5\frac{1}{2}$  per cent. and 6 per cent.; France declined from about  $2\frac{1}{4}$  per cent. of the

total quantity and value to less than 1 per cent. ; Denmark's quota was less than 1 per cent. in both years. On the other hand, Turkey's import rose, in quantity, from less than 2 per cent. to over 3 per cent. of the whole, and, in value, from  $1\frac{1}{2}$  per cent. to nearly 3 per cent. ; Egypt, in quantity, from  $3\frac{1}{4}$  to over 5 per cent., and, in value, from about 3 to over 4 per cent. ; Chili, from  $1\frac{1}{2}$  to nearly 3 per cent. of the total quantity, and from  $1\frac{1}{2}$  to nearly  $2\frac{1}{2}$  per cent. of the value ; British India, from  $1\frac{1}{2}$  per cent. to nearly 7 per cent. of the total quantity, and from  $1\frac{1}{2}$  to over 6 per cent. of the value ; unenumerated countries from  $2\frac{1}{2}$  to over 8 per cent. in quantity, and from less than 3 to nearly 9 per cent. of the total value.

Of other raw grains, barley fell off 22 per cent. in quantity, and nearly 28 per cent. in value ; oats, 12 per cent. in quantity and 17 per cent. in value ; pease, 0.6 per cent. in quantity and 5 per cent. in value ; on the other hand, beans increased 40 per cent. in quantity and 25 per cent. in value ; maize increased over 100 per cent. in quantity and 60 per cent. in value. The last item is especially remarkable, showing a tendency to import more of the cheaper cereals for stock-food and even for human subsistence.

Of flour and wheat-meal, the total quantity increased  $1\frac{1}{2}$  per cent. in quantity and 0.7 per cent. in value. The United States slightly increased her proportion, furnishing about 39 per cent. of the quantity in 1875, and 40 per cent. in 1876. France, next in rank, furnished but 17 per cent. of the whole quantity imported in 1876, against 30 per cent. in 1875 ; Germany increased her proportion of the total quantity from  $12\frac{1}{2}$  to 15 per cent. ; British North America from 5 per cent. to over 14 per cent. ; other countries from  $13\frac{1}{2}$  per cent. to 22 per cent.

Indian-meal imports increased slightly in quantity and about 50 per cent. in value.

The sudden increase in the import of wheat from India has attracted especial attention among European publicists and statisticians. Some attribute it to temporary causes, especially to the decline in the value of silver in Europe without any corresponding decline in India. It is stated that an English wheat importer can now procure by exchange 10,000 rupees for £333, whereas the Hindoo money still retains its old purchasing power of £1,000. This difference pays the cost of transportation to England, and leaves an additional margin of profit. It is argued that this state of things can only be temporary, and that the equilibrium between supply and demand will ultimately absorb this margin, and place the India wheat-trade upon a par with that of other countries. Others argue that the great improvement in internal transportation in the Anglo-Indian empire, and the construction of the Suez Canal, have created a class of economic conditions which will give this trade a permanent vitality, especially as the cotton production of Hindostan has begun to decline, leaving labor and capital available for cereal production.

WINE-POISONING IN FRANCE.—The public mind of France is becoming greatly excited in view of the artificial coloration of wines by means of poisonous ingredients. The feelings of indignation and alarm at this growing evil have manifested themselves in some very formidable demonstrations. Numerous municipal bodies and commercial associations have lately addressed the French government in very strong terms, portraying the extent of the evil by statistics, and calling for efficient measures of repression. Among these official utterances is a communication to the minister of justice, written by M. Paul Massot, president

of the council-general of the Eastern Pyrenees, who was deputized by the council to present their complaint against the evil in question. M. Massot wishes to enforce the protest of a large number of chambers of commerce which have already been presented to the government. The wines of Italy and Spain have long been adulterated by an infusion of elderberries, and this fraud has gradually become common in the vinicultural districts of France, to the serious injury of the legitimate production of the country. But this substance, though misleading wine-consumers and merchants as to the real character of the wines in market, is of little consequence in comparison with the virulent poisons which endanger the life and health of the consumer. Arsenical compounds of fuchsin and *grenat*, a secondary product in manufacture of fuchsin, are now used extensively. The latter had no commercial value until this process of wine-poisoning came into such extended use, but now it sells at very remunerative prices. These ingredients are mingled with other matters, and their villainous character is concealed by very innocent specific names given to the compounds, such as *colorine*, *caramel*, &c. Few of these are sold that do not contain aniline, salts of rosaniline, or the residuary elements left by the production of fuchsin.

M. Massot cites a statement published in the *Annales d'Hygiene Publique* for July, 1876, that in the single village of Odeïllan a grocer of Narbonne sold ammoniacal cochineal to the extent of 10,000 francs (\$2,000) annually, and that this was but one-third of what was known of the extent of the trade in artificial coloring-matters in that village. A very large number of these preparations are very destructive of health. Even in wines colored with elderberries large infusions of alum and other drugs have been detected.

M. Massot states that the revenue-officers, judging wines only from appearance and taste, are incompetent to detect these frauds, and hence he calls for a legal chemical test for both foreign and native wines which shall ascertain the character and extent of these adulterations, and thus place the public on guard against injurious products. Numerous specimens of every brand of wine marketed should be subjected to analysis, and the vending of wines not conforming to these analytic tests should be treated as frauds on the public, for which severe penalties should be meted out to the perpetrators. M. Massot calls upon the municipal authorities of Paris to apply to adulterated wines the same principles of regulation which visit fine and imprisonment upon venders of tainted meats and vegetables.

In the department of Herault, which is credited with a production of nearly 250,000,000 gallons of wine in 1875, the agitation of this question is becoming daily more earnest. The syndicate of wine-traders of the arrondissement of Beziers, at its reunion September 11, 1876, after citing the grave injuries inflicted by every process of artificial coloration upon the quality and reputation of French wines, and especially directing attention to the illicit trade in colorine, caramels, &c., resolved upon the constitution of a syndical commission specially charged with the analysis of specimens of wines marketed through the agency of the syndicate. This commission is to furnish, at the expense of the syndicate, analyses of every kind of wine subjected to its inspection, and especially of those suspected of adulteration. The greatest publicity is to be given to its transactions, and every practicable measure looking to the suppression of the evil is to be energetically used.

The syndicate of commerce of Cette, in a memorial to the minister of agriculture and commerce, citing the repeated complaints of artificial coloration of southern wines by different syndicates in the south, as well

as in Paris, asks the minister to take such measures as will prevent the sale of adulterated wines. The *Journal Officiel*, noticing the repeated and increasing complaints from official bodies and private persons, states that all commissaries of police have been instructed to give their immediate and close attention in this matter. When a brand of wine is suspected of being adulterated, it is to be seized and subjected to analysis by the chemical commission of *arts et métiers*; if it be found to have been tampered with it is to be poured into some brook or river, and the perpetrators of the fraud punished according to law.

The syndicate of wine-merchants in Paris charge that the process of wine-coloration has created growing uneasiness ever since the vintage of 1845, when it suddenly grew to rather formidable proportions. Its influence upon the quality, reputation, and prospects of French wine-production is declared to be very injurious. The questions raised affect both public morals and public health. All tampering with the wine-product by adding elements abnormally changing its character, misrepresenting its real condition, even when not affecting the health of the consumer, are clearly fraudulent, creating false impressions in regard to the value of the product. But some frauds are also destructive of health. The ingredients used, such as arsenical fuchsine and rosaniline, are deadly poisons, as has been clearly demonstrated by scientific experiment. The syndicate do not object to strengthening weak wines with alcohol or sweetening sour wine with sugar. As this is but increasing the proportion of some of the normal elements of the wine itself, it is not regarded as an objectionable adulteration. The syndicate ask the government, through the minister of commerce, for a law imposing penalties upon the adulteration itself and for the confiscation and destruction of all artificially colored wines. In a discussion of this proposition before the Political Economy Society of Paris, a member urged that the practice of coloring wines grew out of the heavy duties imposed upon wine-production since the war. These duties, he says, have so raised prices that cheaper kinds are used, yet consumers desire the articles set upon their tables to bear the appearance, at least, of the better brands. It is to meet this factitious demand that this miserable fraud is perpetrated.

Moved by very numerous and earnest representations of this evil from different parts of the republic, the French executive government has taken cognizance of the question, and developed its line of action in a circular addressed by the minister of justice to the government law-officers in the different jurisdictions. The only coloration which is regarded as a falsification of wine, under existing laws, is that in which substances not legitimate elements of wine are used to modify it. That should be repressed, outside of any fraud committed by the vender. Even where the coloring-matter is not injurious to health, it is illegal and merchants keeping it are to be prosecuted. In case of coloration by injurious substances, the power of the magistrate is ample, and should be energetically exerted to repress the evil. Prosecutions had previously been ordered in some arrondissements as early as June, 1876, and all officers are exhorted to diligence in the work of repression.

**PROTECTION AGAINST THE PHYLLOXERA.**—A recent number of the *Comtes-Rendus* states that M. Gachez, after long and patient research, has become convinced that rows of grape-vines with intercalary rows of red maize are completely shielded from the ravages of the phylloxera, the insect abandoning the roots of the vine to prey upon the roots of the maize. M. Gachez tried this method upon vines, the roots of which, last spring, were covered with these insects. In September, the most

careful examination failed to detect a single one on the vines. The roots of maize planted in a field alongside the vineyard did not present any trace of the phylloxera.

M. Pignède found an effective remedy in digging, during March and April, a trench 4 inches deep around his infested vines, and throwing in 500 grams (1.1025 pounds) of burnt lime. He then whitewashed the vine after having removed its bark. This operation, he declares, destroyed the greater part of the insects and their eggs, and arrested the hatching of the eggs already deposited upon the vine. The first year afterward the vines gave out vigorous shoots, and the second year fine grapes in large quantities. The lime, applied to healthy vines, preserves them from the attacks of the phylloxera.

**NATIONAL AGRONOMIC INSTITUTE OF FRANCE.**—The republic, which sprang from the revolution of 1848, signalized its devotion to the productive interests of France by organizing at Versailles (October 3, 1848) an agricultural university with the above title, a school of the highest rank, and embracing the widest range of agricultural and zootechnic studies then known. The full significance and value of the enterprise was but superficially understood by those who were charged with its primary organization. Its legitimate university character was ignored, and its resources were mostly limited to the maintenance of a museum of living type-animals. Its large experimental area of 1,525 hectares (3,362.22 acres) was absorbed mainly by horse-farms, cattle-farms, sheep-farms, &c., leaving but a small portion for investigations outside of zoötechny. It contained representatives of all the European types of farm-animals, including 300 cattle, 120 horses, and 2,000 sheep. It very imperfectly represented other great branches of agricultural production.

In 1851 its direction was confided to Count Gasparin, one of the most illustrious agronomists of the nineteenth century, who at once recognized the errors of its previous administration, and projected radical reforms intended to realize more thoroughly the legitimate aims of a university. He abandoned the cumbrous and expensive farm organizations which parceled out the experimental area, discharged a host of supernumerary officials, and cut down the expenses of administration. He retained a sufficient number of choice animals to fully illustrate specific types of reproduction, and the remainder he sold or distributed among the regional and farm schools devoted to special cultures. He organized a system of general experimental culture and instruction, embracing all branches of agricultural production, just such as was suited to the wants of all the agricultural regions of France.

But these nobly administrative reforms were rendered nugatory by a decree dated September 17, 1852, issued by authority of Louis Napoleon, President of the French Republic, whereby the Agronomic Institute of Versailles was suppressed, on the pretext that its curriculum of studies was too extended and abstract for the necessities of French agriculture. The corps of instructors was disbanded, and the costly material that had been gathered was either scattered or wasted. The experimental grounds grew up in briars, thistles, and wild shrubbery, and became the hunting-grounds of the imperial myrmidons of the second empire. This reactionary measure has been deeply deplored by French agronomists as retarding, to an incalculable degree, the scientific development of agriculture in France.

The republican principle, which has finally predominated in the reconstitution of the French government, exhibited its true instinct of progress in re-organizing, by act of August 9, 1876, the National Agronomic

Institute. Its headquarters will be at the *Conservatoire des Arts et des Metiers*, in Paris, with an experimental area of 50 hectares (126½ acres) at Vincennes, four miles east of the city. The great ideas of Gasparin will direct its re-organization, and its resources will be devoted to the highest scientific instruction, leaving minor specialities to the regional and farm schools, which are better adapted to specific lines of inquiry and experiment. Three great regional high schools make a special study of the agricultural needs of the northern, western, and southern regions of France. The school of Grignon, in the department of Seine-et-Oise, not far from Paris, devotes chief attention to *grande culture*, grasses, cereals, "industrial" crops, and stock breeding, which have a characteristic development in the high culture of the northern departments. An agricultural station attached to this school gives facilities for extended experimental researches. The school of Grand-Jouan, in the department of Loire-Inferieure, studies especially the methods of bringing virgin lands under culture, mixed pastoral husbandry, tenant-farming, natural meadows, live-stock breeding, "industrial" and fruit crops, &c., with reference to the less elaborate agricultural system of the west and center. The school of Montpellier, in the department of Hérault, represents the agricultural peculiarities of the Mediterranean region, embracing the replanting of forests, irrigation, and other great enterprises. Its sericultural and viticultural station gives special facilities for the development of two grand leading interests of southern agriculture. The farm-schools still further differentiate the methods of experiment and instruction of young farmers, so as to adapt them to the wants of local communities. With all these facilities for specific lines of investigation and discipline, it is evidently the true policy to confine the movements of the great central university to the higher and more abstract truths which underlie the whole subject of agriculture. Hence the experimental area will be quite limited compared with its original dimensions, and its management will be directed only to the investigation and illustration of general principles.

The law for the re-organization of the institute passed both houses of the French legislature August 9, 1876. Two days later the minister of agriculture announced the commission of re-organization, embracing the leading agriculturists, private and official, of the republic. This commission have established the following among their general regulations: The pupils will be divided into two general classes, day pupils and free hearers; no boarding pupils being admitted, as in the regional and farm schools in the rural districts. Day pupils must either present diplomas showing that they have received from some respectable literary institution the degree of bachelor of science, or they must pass examination in a course of study equivalent to what is usually required for such a degree. Free hearers are admitted without any questions as to literary qualifications. Day pupils pay a tuition-fee of 300 francs per annum; free hearers, 25 francs. Four scholarships of 1,000 francs foundation and two of 500 francs have been established. Ten gratuitous scholarships are to be divided equally between the regular graduates of the subordinate agricultural schools and other claimants. Diplomas will be given to those satisfactorily completing the course of study, and the two highest in scholastic merit in each graduating class will receive a complimentary mission of extended study either in France or in some foreign country.

By decree of October 9, 1876, on the nomination of the commission of organization, the minister of agriculture, M. Teisserenc de Bort, appointed the following members of the board of instruction and experi-

mentation: M. Boussingault, director of laboratory researches; M. Leonce de Lavergne and M. Ed. Leconteux, professors of rural economy; M. Edmund Becquerel, of physics and meteorology; M. Delesse, of geology; M. Carnot, of minerology; M. Schloesing, of agricultural chemistry; M. Peligot, of analytical chemistry; M. Aimé Girard, of agricultural technology; M. Ed. Prilleux, of botany; M. Emile Blanchard, of zoology; M. Tresca, of mechanics; M. Hervé Mangon, of rural engineering; M. Moll, of general agriculture; M. E. Risler, of comparative agriculture; M. Tassey, of sylviculture; M. du Breuil, of horticulture, arboriculture, and viticulture; M. Victor Lefranc, of legislation and agricultural jurisprudence.

These men are among the foremost scientific agriculturists of France. M. Lavergne is a senator, quite a number are members of the Institute of France; the others are nearly all professors of scientific institutions, of whom several were members of the faculty of the old Agronomic Institute when under the presidency of Count Gasparin.

FRENCH INTERNATIONAL EXPOSITION.—The exposition will be opened May 1, 1878, and continue till October 1 following, at Champ de Mars and Trocadero. The objects exposed will be arranged in nine groups, viz: I. Works of art; II. Education and instruction, including the processes and materials of the liberal arts; III. Household furniture, &c.; IV. Cloths, clothing, &c.; V. Extractive industries, crude products; VI. Tools and processes of mechanical industries; VII. Alimentary products; VIII. Agriculture and pisciculture; IX. Horticulture. The above groups will be subdivided into ninety classes, of which only the following pertain to agriculture and horticulture:

GROUP V.—*Class 44: Products of forestry exploitations and industries*, viz: Specimens of peculiar forest trees; timber for construction, working, and fuel; lumber for ship-building and for construction of buildings on land; cork; textile-barks; tanning, coloring, odoriferous and resinous materials; dried wood and charcoal; crude potash; cooperage, basket-work; wooden shoes; esparto-grass fabrics, &c.

*Class 46.—Agricultural products not alimentary*, viz: Textile matters, raw cottons; flax and hemp, either dressed or undressed; textile fabrics of all sorts; wool, washed and unwashed; silk-cocoons; agricultural products employed in industry, pharmacy, and domestic economy; oleaginous plants, oils, waxes, and resins; tobacco, in leaf and manufactured; tanning and coloring matters; touchwood; forage-plants preserved, and other matter specially prepared for the feeding of farm animals.

GROUP VI.—*Class 51: Materials and processes of rural and forest exploitations*, viz: Plans of culture, rotation of crops and agricultural management; materials and operations of agricultural engineering; drainage; irrigation; plans and models of farm buildings; tools, machines, and engines for working the soil, for sowing, planting, harvesting, and storing crops; machinery moved by animal or steam-power; materials for farm transportation; locomotive machinery and methods; organic and mineral fertilizers; apparatus for the physical and chemical study of soils; methods of re-afforesting denuded areas; management and culture of forests; materials of forest exploitations and industries; materials, instruments, and machines for manufacturing tobacco.

*Class 52: Materials and processes of agricultural manufactories and of alimentary industries*, viz: Factories of artificial fertilizers and tile-drains; dairies, cheese and butter factories; fecula, starch, and oil factories; breweries and distilleries; sugar factories and refineries; ate-

liers for the preparation of textile materials; silk-worm nurseries; bakeries and bakers' ovens; utensils for the manufacture of pastry and confectionery; apparatus for manufacturing alimentary paste, sea-biscuit, &c.; for the preparation of chocolate and the roasting of coffee; fabrication and preservation of ice and the preparation of ices and sherbets.

GROUP VII.—*Class 60: Cereals and farinaceous products and their preparations*, viz: Wheat, rye, barley, rice, maize, millet, and other cereals, in grain and in flour or meal; grain, hulled and in grits; fecula of potatoes, rice, and lentils; gluten; tapioca, sago, arrowroot, cassava, and other feculent matters; mixed farinaceous products; Italian pastry, vermicelli, macaroni, &c.; substitutes for bread, puddings, domestic pastry, &c.

*Class 71: Fat alimentary bodies, milk-diet and eggs*, viz: Edible fats and oils; milk, fresh and preserved; butter, salt and fresh; cheese; eggs of all sorts.

*Class 72.—Meats and fishes.*—Viz: All sorts of salt meats and meats preserved by different processes; cakes of meat, and soup; hams and preparations of meat; poultry and game; fish, salt and packed; codfish, herrings, &c.; fish preserved in oil, sardines; pickled mackerel; lobsters, shrimps, oysters, and their preparations, anchovies, &c.

*Class 73.—Vegetables and fruits.*—Viz: Potatoes; dry farinaceous vegetables, such as beans, lentils, &c.; cabbages, &c.; carrots, turnips, &c.; onions, garlic, &c.; salads; gourds; citrons; melons; vegetables preserved by different processes; fruits, fresh, dry, and prepared; prunes, figs, raisins, &c.; fruits preserved without the agency of sugar.

*Class 75.—Fermented drinks.*—Wines, common red and white; sweet, mixed, and sparkling; cider, perry, and drinks extracted from cereals; fermented drinks from vegetable sap, milk, and all sorts of saccharine matters; brandy and alcohol; gin, rum, tafia, kirschwasser, &c.

GROUP VIII.—*Class 76.—Specimens of rural exploitations and of agricultural workshops.*—Types of rural buildings of different countries; of stables, sheep-folds and sheep-parks, piggeries, and other establishments for the breeding and rearing of farm-animals; materials for the construction of the foregoing; apparatus for preparing food for live-stock; steam plows, harvesters, mowers, fanning-mills, thrashing-machines, &c. types of agricultural manufactories, distilleries, sugar factories and refineries, breweries, distilleries, fecula and starch factories, and silk-worm nurseries; presses for wine, cider, and oil, &c.

*Class 77.—Horses, asses and mules.*

*Class 78.—Cattle, buffaloes, &c.*

*Class 79.—Sheep and goats.*

*Class 80.—Swine, rabbits, &c.*

*Class 81.—Barn-yard fowls.*—Types of poultry, pigeons, pheasants, &c.; apparatus for artificial hatching.

*Class 82.—Dogs.*—Shepherd's dogs, watch-dogs, hunting-dogs, fancy dogs; specimens of kennels, &c.

*Class 83.—Insects, useful and injurious.*—Bees; silk-worms and other moths; cochineal; material for the raising and preservation of bees and silk-worms; materials and processes for the destruction of injurious insects.

*Class 84.—Fishes, crustaceans and mollusks.*—Aquatic animals, useful in the living state; aquariums; processes of pisciculture; materials for the breeding of fish; mollusks, &c.

GROUP IX.—*Class 85.—Greenhouses, and materials of horticulture.*—Tools of gardeners, viticulturists, and horticulturists; apparatus for

watering and keeping the turf; large greenhouses with their appurtenances; small conservatories for the apartment and for the window; aquariums for aquatic plants; water-jets and apparatus for ornamenting gardens.

*Class 86.—Flowers and ornamental plants.*—Species of plants and specimens of culture illustrating the characteristic types of gardens and residences of each country.

*Class 87.—Kitchen-garden plants.*—Species of plants and methods of culture characteristic of each country.

*Class 88.—Fruits and fruit-trees.*—Species and methods illustrating the pomology of different countries.

*Class 89.—Seeds and plants of forest trees.*—Species of plants and methods of culture characteristic of different countries.

*Class 90.—Greenhouse plants.*—Specimens of cultures adapted to different countries, either for utility or pleasure.

The juries of admission to these several classes have been appointed, embracing leading scientific, industrial, and commercial men of France.

**VITAL STATISTICS OF SWITZERLAND.**—The Swiss Federal Bureau of Statistics has recently published a general statement of births, deaths, and marriages in Switzerland during the first quarter of the current year. The number of marriages is about 1.8 per each 1,000 inhabitants, or 5,012 in all, the population being stated at 2,750,135 souls. This would give an average of 7.2 per 1,000 for the whole year, whereas the average from 1867 to 1871 was about 7. This figure is lower than that of other European populations. Italy, from 1868 to 1870, averaged 7.4 per 1,000; France, 8 per 1,000 from 1861 to 1865; England 8.1, and the grand duchy of Baden 8.4, from 1867 to 1871; Bavaria, 8.5 from 1864 to 1868; Austria, 9.6 from 1867 to 1871.

The total number of births during the first quarter of 1876 was 23,612, which would give 35.88 per 1,000 inhabitants for the entire year, if the proportion was uniform. But the dead-born amounted to 1.55 per 1,000, or 4.3 per cent. of the total number of births. The proportion of male births is unusual, 106.8 to 100; this proportion is still greater among the dead-born, which show 121 males to 100 females. The proportion of total births for the quarter is greater than the average of past years.

Not counting dead-born infants, the total of deaths was 19,195 during the quarter; including those, the proportion of deaths was 29.48 per 1,000. As the rate of mortality is usually greater during the winter, this average is too large for the whole year. From 1867 to 1871 this average in Switzerland was 25.6 per 1,000. The regular average of Hamburg, with its urban population, is 26.5 per 1,000 inhabitants.

**WOOL PRODUCTION AND MANUFACTURE IN GERMANY.**—M. Maurice Block, a prominent French statistician, gives the following results of a voluminous analysis of German wool-trade reports, embracing 102 chambers of commerce and about 200 societies, reunions, and great manufacturing establishments. Wool manufacture in Germany ranks in importance next to that of England and France. It employs 1,250,000 spindles for carded wool and 530,000 for combed wool, while Austro-Hungary has but 600,000 for the former and 80,000 for the latter; Italy has 250,000 for the former and 28,000 for the latter. France has 2,898,929 spindles working up unmixed wool and 403,453 mixed wool, without regard to the method of preparation. England reports 3,165,569 spindles for carded wool and 2,182,792 for combed wool.

During three years, from 1872 to 1874, Germany imported on an

average about 110,236,000 pounds of uncarded wool, 4,400,000 pounds of combed wool, and 6,600,000 pounds of what is called "artificial" wool—a synonym for shoddy. Of spun wool she receives from 30,000,000 to 32,000,000 pounds not colored and 4,500,000 pounds colored; of tissues and felt about 11,000,000 pounds, fulled but not printed, and about half that quantity not fulled. Her import of upholstery and other manufactures is small. The export of unmanufactured wool shows a wide range of variation, amounting to about 40,000,000 pounds in 1872, 26,000,000 in 1873, and 48,000,000 in 1874. Combed wool shows less fluctuation, averaging about 550,000 pounds per annum, and shoddy 16,500,000 pounds. Unmixed wools average 11,000,000 pounds; tissues, fulled but not colored, ranged from 11,500,000 pounds to 16,000,000 pounds; tissues, not fulled, from 14,850,000 pounds to 18,260,000 pounds. The exports include about 1,760,000 pounds of wool in upholstery, and 1,100,000 to 1,210,000 pounds in other small wares.

Germany in combing-wool fabrics finds her most formidable rival in France, which has easy access to the original supply markets for raw material, large accumulations of capital, and an abundance of skilled labor. Many German weavers have their wool spun in France. This branch of manufacture has but lately been inaugurated in Belgium, but it is developing rapidly, and promises soon to invade the German markets if no further tariff-duties be imposed. Switzerland, with an abundance of cheap labor and unused natural motive-power, also sends spun wool to Germany. Austria and Russia are both dependent upon Germany and Alsace for spun wool. Carpet manufacture was inaugurated in 1854 under a strong tariff protection, and so long as that policy was maintained this industry flourished, but since its abrogation English carpets have measurably driven German carpets from their own home markets. The tariff question in Germany is beset by the claims of conflicting interests both at home and abroad, and the reports cited by M. Block attest the confusion in which the subject is involved.

POPULATION OF GERMANY.—The "Year-book" of Saxony for 1877 gives the population of the German Empire by States for 1871 and 1875 as follows:

States.	1875.	1871.	Percentage of increase, (+), decrease, (-)
Prussia .....	25,723,754	24,641,539	+ 1.07
Lunenbourg .....	48,808	49,546	- 0.38
Bavaria .....	5,024,832	4,863,450	+ 0.82
Saxony .....	2,760,586	2,556,244	+ 1.99
Württemberg .....	1,881,505	1,818,539	+ 0.85
Baden .....	1,506,531	1,461,562	+ 0.76
Hessia .....	882,349	852,894	+ 0.85
Mecklenburg-Schwerin .....	553,734	557,707	- 0.18
Sachsen-Weimar .....	292,933	286,183	+ 0.58
Mecklenburg-Strelitz .....	95,648	96,982	- 0.35
Oldenburg .....	319,314	314,591	+ 0.37
Brunswick .....	328,352	312,170	+ 1.26
Sachsen-Meiningen .....	194,463	187,957	+ 0.85
Sachsen-Altenburg .....	145,844	142,122	+ 0.65
Sachsen-Koburg-Gotha .....	182,673	174,339	+ 1.17
Anhalt .....	213,689	203,437	+ 1.23
Schwarzburg-Rudolstadt .....	76,676	75,523	+ 0.38
Schwarzburg-Sondershausen .....	67,480	67,191	+ 0.11
Waldeck .....	54,673	56,224	- 0.70
Reuss, (old line) .....	46,985	45,094	+ 1.03
Reuss, (new line) .....	92,375	89,032	+ 0.92
Schaumburg-Lippe .....	32,941	32,059	+ 0.68
Lippe .....	114,254	111,135	+ 0.69
Lübeck .....	56,912	52,158	+ 2.18
Bremen .....	142,645	111,402	+ 3.82
Hamburg .....	388,618	338,974	+ 3.41
Alsace-Lorraine .....	1,529,408	1,549,738	- 0.33
German Empire .....	42,757,982	41,058,792	+ 1.03

STATISTICS OF SAXONY.—In an address before the Economic Society of Saxony, Herr von Langsdorff stated that, according to the census of 1871, 16.21 per cent. of the Saxon people are engaged in agriculture, forestry, gardening, viticulture, hunting, and fishing; 51.83 per cent. in mining and manufactures; 10.13 per cent. in commerce; 11.82 per cent. were day-laborers and servants; 0.96 per cent. in the army and navy; 4.15 per cent. in other occupations, and 4.90 per cent. without regular occupation. Agriculture, though occupying but a small portion of the population, is by no means an unimportant industry. A dense population, by its greater demand for soil-products, induces a more effective culture, and renders agriculture a more complete specialty, in which every improved process is placed under immediate requisition.

Some years ago Saxony raised enough of agricultural produce to cover her own consumption, but her imports of grain and meat have gradually increased, showing in 1874 an excess over exports of 424,521,660 pounds of grain, and 17,957,174 pounds of meat, with proportionate amounts of butter, lard, vegetables, fruits, &c. This surplus is drawn mostly from Eastern Europe.

This state of things is attributed principally to the rapid increase of population, which rose from 1,595,668 in 1834 to 2,556,244 in 1871, an increase of 60.19 per cent. in 37 years. Meat consumption increased at an almost equal rate during that period, rising from 38.4 pounds per capita in 1839 to 60.8 pounds in 1874, or 58 per cent. in 35 years. Agricultural production has increased but moderately. Taking two periods of four years each, 1846-'50 and 1868-'72, the average wheat product of the former period was 2,926,000 centners, and of the latter 3,238,000 centners, an increase of only 10.6 per cent.; rye production increased from 5,466,000 centners to 5,598,000, or 2.4 per cent.; barley, from 2,018,000 to 2,359,000, or 16.9 per cent.; oats, from 3,974,000 to 4,901,000, or 23.3 per cent.; the total product of these four crops, from 14,384,000 centners to 16,096,000, or 11.9 per cent. A centner is equal to 113.37 pounds.

Reckoning 10 sheep or goats, or 3 hogs as equivalent to one head of cattle, there were in 1839 667,638 head, and in 1869 774,961 head, showing an increase in 30 years of only 16 per cent. The average carcass weight of cattle was 352 pounds in 1840, 406 in 1851, 423 in 1860, and 482 in 1869; the carcass weight of swine averaged 105 in 1840, 128 in 1851, 154 in 1860, and 165 in 1869—that is, in 30 years the average weight of cattle increased 37 per cent. and of swine 57 per cent. The demand for meat has grown much more rapidly than the production.

Within fifteen or twenty years, the wages of skilled labor have advanced from 40 to 100 per cent. This has attracted labor from agriculture to manufactures, and from the country to the city. In some parts of the country reliable labor is scarce, so that instances are related in which hay has rotted in the meadow, potatoes have frozen in the ground, and over-ripe grain has perished in the field, for lack of harvest-hands to gather and house the crops.

**PROGRESS OF ITALIAN AGRICULTURE.**—The agricultural interest in Italy displays increasing vitality, and is making demonstrations upon the general market of Europe, causing some concern to foreign nations which have hitherto nearly monopolized several branches of trade. Wine production especially has made great progress of late years, and has attained an annual yield of 32,000,000 hectoliters, (845,369,600 gallons.) The wines of Italy approach the excellence of French wines in color, body, and bouquet. Their good qualities result less from culture and management than from superb natural conditions of soil and climate. The wines of Southern France will be especially affected by the competition of Italian wine. But other branches of peninsular agriculture are developing unexpected vitality. The markets of Germany, Austria, and Russia are becoming familiar with Italian vegetables and fruits, in their fresh and luscious state. Italian farmers are employing annually a smaller amount of commercial fertilizers, but they are enlarging the manufacture of farm-yard manures, and they are learning to concoct their own artificial fertilizers from original elements.

The Italian stock-raisers' congress lately held its fifth annual session at Padua, under the presidency of Professor Keller, who, in his inaugural address, insisted that in Italy live-stock production is on an inadequate scale. While the Italian farmer is satisfied with 12 head of cattle per square kilometer, (247.1282 acres,) a Hungarian would count 16; an Englishman, 23; a Dutchman or Belgian, 42. In Italy there are 130 cattle for each one thousand inhabitants, while in many other European states the proportion is 300 or 400 per thousand people. The professor urged the improvement of the breeds of Italian cattle and a more intel-

ligent application of the laws of animal hygiene as an essential part of the future agricultural policy of Italy.

Official statistics show that the kingdom contains nearly 9,000,000 sheep, the larger proportion being in the southern provinces, where rational cultivation of the soil is hampered by the traditional ideas of fallowing. More land is annually brought under cultivation as the government is gradually releasing land-owners from the pressure of ancient customs. Contrary to popular prejudices persistently held, the breaking up of fallow brings improved conditions both to cropping and livestock interests.

On a vast plain in the province of Capitanata, known as the Tavoliere delle Puglie, comprising nearly 750,000 acres, two-thirds of which has been preserved unbroken and used only for pasturage, the accumulation of sheep-droppings is wonderful. These deposits have also attracted the attention of agricultural chemists. From October to May, about 600,000 sheep are annually kept on the plain of Puglie, their summer pastures being on the mountains of Abruzzo. They are divided into flocks ranging from 500 to 15,000, and averaging about 2,000 head. They are kept at nights in rectangular enclosures on ground with a sufficient declivity to carry off the water and protect the sheep from the north winds. Of late years large sheds have been erected to shelter the flocks. This has resulted in a difference in the composition of the manure. That dropped in the open air, dissolved by the rain, baked by the sun, and trampled by the animals, is reduced by mixture with the soil to a kind of organic mold which constitutes an excellent manure, and is obtainable at a low price. The droppings accumulated under the sheds, being protected from the action of the sun and rain, are but little decomposed and preserve their fertilizing matters intact. These will bear a greater transportation, and very large quantities are annually sold to the neighboring farmers. The latter kind is richer in organic matter and ammoniacal salts as well as in soda, but not so rich in phosphoric acid, potash, sulphuric acid, oxide of iron, lime, and magnesia; they also contain less water.

**MEAT CONSUMPTION IN EUROPE.**—M. Zundel, a veterinary surgeon residing in Strasburg, has published a work on the general aspects of meat consumption in Europe, in which he attempts to determine from statistical and physiological inquiries the proportion of animal to vegetable diet in different countries. He estimates the average annual consumption per capita of meat by different races, as follows: Spanish, 24 $\frac{1}{4}$  pounds; Italian, 33.07; Swedish, 52.91; Prussian, 55.12; Austrian, 57 $\frac{1}{3}$ ; Belgian, 66 $\frac{1}{7}$ ; French, 68.35; South German, 77 $\frac{1}{8}$ ; Mecklenburger, 83 $\frac{3}{4}$ ; English, 180 $\frac{3}{4}$ .

These results are very remarkable. Taking the consumption of the Englishman as a standard of comparison, that of the Spaniard is but 13.4 per cent.; Italian, 18.4; Swede, 29.27; Prussian, 30.49; Austrian, 31.72; Belgian, 36.59; Frenchman, 37.77; South German, 42.69; Mecklenburger, 46.33. If these statistics present even a respectable approximation to the real facts, they show that the Englishman consumes about twice as much meat as any other European. The first article of the report of the Royal Agricultural Society of England for 1876 estimates the average consumption of the United Kingdom at 114 pounds per capita; the average is known to be much larger in England than in either Ireland or Scotland.

A marked difference is also observable in the annual meat consumption of city and rural populations in Europe. In cities of 10,000 inhabitants or over the estimates range from 110 to 165 pounds per capita, while the great capitals show an immensely greater consump-

tion: Berlin is credited with 176 pounds per capita; Vienna, 209; Paris, 242½; London, 264½. This very large city consumption must greatly reduce the average of the rural districts, but statistical inquiry has not yet gathered enough local and elementary facts for generalizations of even approximate accuracy.

The conclusions of M. Zundel have raised several very interesting questions among European statisticians, some of which seem to unsettle what have hitherto been received as established truths. Comparing the Englishman and the Spaniard, the extremes in the above series of flesh-eaters, the former consumes seven and a half times as much meat per annum as the latter. Whatever muscular superiority may be claimed for the Englishman, it is evident that he is not equal to seven and a half Spaniards. Hence his surplus of meat consumption is not all expended in the production of brawn and muscle. The cold, humid climate of the British isles demands a larger amount of the concentrated aliment found in animal food, in order to maintain the average normal tone of the system, than the dry, hot climate of the Spanish peninsula. But it is a well-known fact that the flesh-eating races of Northern Europe have always excelled the vegetarians of the Mediterranean peninsulas in massive physical strength.

Again, the difference between city and rural consumption requires an extended range of facts for its explanation. It would be exceedingly rash to assume that city people are better fed, on the average, than country people, considering the number and necessities of the indigent classes of each. It is notorious that in physical health and strength the peasantry have the advantage. The excess of city consumption does not, then, operate to enhance the muscular or vital force of the population; it is needed to repair the waste of physical energies resulting from quickened nervous activity. The numerous and wearing excitements and agitations of a multitude crowded into a small space, and in a constant struggle for subsistence in mechanical or commercial occupations, generally of a sedentary character and calculated to repress the free development of physical manhood, create a constant drain upon the constitution, which can be met only by the free use of food in which the nitrogenous elements are abundant and readily assimilable. Some, who are not disposed to question the preceding generalization in regard to meat consumption, suggest that the peasant finds his proportion of azote in other kinds of food, as, for instance, the oats diet of Scotland. Others contend that the excess of meat consumption in the larger cities is greater in appearance than reality; that the facilities for statistical inquiry in the rural districts and in smaller towns being more limited, the results do not approximate so nearly to the truth. It is agreed that nothing in the later developments of this question invalidates the principle hitherto accepted, viz, that in two individuals of equal constitution and organic force, living in the same climate and under other circumstances equally influencing vital action, the sum of mechanical effects will be in proportion to the amount of nitrogen actually assimilated.

M. Zundel's statistics indicate an inferior quality in the meat consumed by the populations of Central Europe outside the great cities. Cattle-dealers agree that in rural markets well-fattened animals are not more profitable than those in moderate conditions—that the fattening process is in many instances one of unmingled loss. In Southern Germany the net meat product of the animal formerly amounted to 53 or 54 per cent. of the live weight, and of late has fallen as low as to 45 per cent. Formerly in Paris the proportion was from 55 to 60 per cent., but of later years has fallen to 52 and 55 per cent. The English have always demanded a high standard, and hence their marketed animals are expected to net 65 or even

per cent. A French statistician, M. Gayot, in the *Journal Pratique d'Agriculture*, contends that M. Zundel has understated the French standard, which has not degenerated, but still shows from 55 to 60 per cent. He claims as a characteristic of French production that a step of progress once realized is never lost, and that every improvement there possesses a permanent character. He further contends that the English standard has been exaggerated by M. Zundel. The English market-animals being of essentially adipose tendencies, yield a larger proportion of fat than the more brawny breeds of other countries. French stock-raisers have fallen into the error of excessive fattening, and some of their adipose specimens lately exhibited at the Palace of Industry in Paris have called forth sharp criticisms in the French agricultural press. A writer in the *Journal Pratique d'Agriculture* contends that this policy is diminishing the volume and robust temperament of the choice breeds of England, and also depreciating their capacities for milk-production, as is shown by the increasing importation of butter and cheese. The Durham breed especially exhibits this degeneracy in temperament and milking qualities. Fancy prices have stimulated the reproduction of fashionable forms and a specific *embonpoint*, while a pampering treatment in warm stables, with blanket-coverings, and a stimulating, farinaceous diet have undermined the choice animals of this breed. The critic had before him an engraving of a type-specimen of the Durham cattle, executed in 1801, and representing their points at the beginning of this century. The inscription gave them the name of the Holderness breed, which subsequently was transmuted into the name Durham. The gigantic proportions of the animals represented contrast strongly with the delicate type-specimens which attract sentimental British breeders of to-day. Beauty of form but ill compensates the massive and brawny development which has disappeared in the modern Durham. Capacity to produce rapidly and abundantly a superior quality of marketable meat is not identical with that which brings out symmetrical forms, for these may result from the packing of adipose matter under the skin, and the fat-forming tendency can govern only by depressing the flesh-forming principle. Excessive precocity combined with adipose tendencies renders the meat of less nutritive value, especially to the laboring-man, whose ration of consumption must be increased in order to secure the requisite amount of nitrogenous aliment.

M. Zundel finds, after careful examination, that sanitary regulations in regard to the sale of flesh of diseased animals have lost force and efficiency of later years either through the failure to re-enact provisions of old laws in modern revisions or from the adverse tendencies of construction that have prevailed in judicial tribunals. In 1858 a law journal in France declared that these repressive regulations had no foundation in the law as carefully interpreted, and that tribunals enforcing it had recourse to strained interpretations of the legal text. This is a question which will probably attract attention both from a scientific and a legal standpoint.

**RAILROAD-MILEAGE OF THE WORLD.**—The *Moniteur Industriel Belge* sums up the railway-mileage of the world as follows:

In Europe, the British isles have 16,354 miles; France, 14,190; Belgium, 1,049; Switzerland, 1,018; Germany, 12,075; Denmark, 538; Sweden, 2,261; Norway, 275; Russia, 12,075; Austria, 6,104; Hungary, 3,986; Roumania, 515; Turkey, 650; Greece, 7; Italy, 4,675; Spain, 3,243; Portugal, 527—total 81,816.

In Asia, Turkey has 205 miles, Caucasus, 186; British Indies, 6,371; Ceylon, 51; Java, 166, Japan, 17—total for Asia, 6,996.

Arstralia has 1,396 and New Zealand 151, making, for Oceanica, 1,547.

In Africa. Egypt has constructed 1,107; Algeria, 319; Cape of Good Hope and Natal, 66; Mauritius, 66—total for Africa, 1,588 miles.

In North America, the United States has 79,988 miles; Canada, 4,002; Mexico, 333; Cuba, 334; Jamaica, 26; Costa Rica, 42; Honduras, 52—total for North America, 84,817.

In South America, Columbia has 50 miles; Bolivia, 28; Venezuela, 8; Brazil, 786; Paraguay, 43; Uruguay, 358; Argentine Republic, 1,367; Chili, 753; Peru, 994—total for South America, 4,387.

Grand total for the world, 181,151.

**COTTON MANUFACTURE AND CONSUMPTION IN THE WORLD.**—A writer in the *Economiste Français* estimates, in round numbers, the spindles in the cotton-factories of Europe and America, with their average annual consumption of cotton, as follows: England, 35,000,000 spindles, consuming 1,264,000,000 pounds of cotton; United States, 9,859,000 spindles and 563,000,000 pounds; France, 5,200,000 spindles and 197,000,000 pounds; Germany, 5,100,000 spindles and 228,000,000 pounds; Switzerland, 2,500,000 spindles and 56,000,000 pounds; Russia, 2,000,000 spindles and 120,000,000 pounds; Austria, 1,600,000 spindles and 106,000,000 pounds; Spain, 1,400,000 spindles and 67,000,000 pounds; Belgium, 650,000 and 27,000,000 pounds; Italy, 500,000 spindles and 14,000,000 pounds; Denmark, 300,000 spindles and 18,000,000 pounds; Holland, 250,000 spindles and 9,000,000 pounds; total, 64,089,000 spindles and 2,669,000,000 pounds.

This estimate assigns to England 54.61 per cent. of the spindles and 47.36 per cent. of the consumption; to the United States, 14.96 per cent. of the spindles and 21.09 per cent. of the consumption; to France, 8.11 per cent. of the spindles and 7.33 per cent. of the consumption; to Germany, 7.95 per cent. of the spindles and 8.54 per cent. of the consumption.

The average annual consumption of each spindle throughout the world is 41.64 pounds; in England, 36.11; the United States, 58.7; France, 36.32; Germany, 44.71; Switzerland, 22.40; Russia, 60; Austria, 66.25; Spain, 47.85; Belgium, 41.54; Italy, 28; Denmark, 60; Holland, 36.

Ellison & Co., in their annual review of the cotton-trade for the season of 1875-'76, state that the number of spindles in the United Kingdom, at the close of 1874, was 37,515,000, not including doubling spindles; from 1,250,000 to 1,500,000 have been added since, raising the aggregate to about 39,000,000; a large number of the old spindles have been replaced by new ones. They estimate the amounts of cotton delivered to the spinners and actually consumed by them as follows: 1872-'73, 1,280,640,000 pounds delivered and 1,227,453,000 pounds actually consumed, leaving a surplus of 53,187,000 pounds; 1873-'74, 1,240,706,000 pounds delivered and 1,259,836,000 pounds consumed, leaving a surplus of consumption 19,130,000 pounds, to be deducted from the surplus delivery of the preceding year; 1874-'75, 1,198,838,000 pounds delivered and 1,224,377,000 pounds consumed, making a still further draw upon the surplus of 1872-'73 of 25,539,000 pounds; 1875-'76, delivery and consumption, each estimated at 1,270,287,000, leaving a surplus delivery of 8,518,000 pounds yet unconsumed.

The number of spindles and the consumption of cotton on the continent are estimated by Ellison & Co. as follows; Russia and Poland, 2,500,000 spindles and 150,000,000 pounds of cotton, averaging 60 pounds per spindle; Sweden and Norway, 305,000 spindles and 19,825,000 pounds, averaging 65 pounds per spindle; Germany, 4,650,000

spindles and 255,750,000 pounds, averaging 55 pounds per spindle; Austria, 1,555,000 spindles and 104,185,000 pounds, averaging 67 pounds per spindle; Switzerland, 1,850,000 spindles and 46,250,000 pounds, averaging 25 pounds per spindle; Holland, 230,000 spindles and 13,800,000 pounds, averaging 60 pounds per spindle; Belgium, 800,000 spindles and 40,000,000 pounds, averaging 50 pounds per spindle; France, 5,000,000 spindles and 210,000,000 pounds, averaging 42 pounds per spindle; Spain, 1,750,000 spindles and 80,500,000 pounds, averaging 46 pounds per spindle; Italy, 800,000 spindles and 44,800,000 pounds, averaging 56 pounds per spindle; total for the continental manufacture, 19,440,000 spindles and 965,110,000 pounds, averaging 49.6 pounds per spindle. Adding for the United Kingdom 39,000,000 spindles and 1,270,287,000 pounds of cotton, averaging 32.57 pounds per spindle, and we find for the whole of Europe 58,440,000 spindles and 2,235,397,000 pounds, averaging 38.25 pounds per spindle. The United States, with 9,600,000 spindles, consuming the past season 1,356,598 bales, which, at 450 pounds per bale, (rather an understatement,) gives an aggregate consumption of 610,468,100 pounds, averaging 63.59 pounds per spindle; adding these aggregates to the preceding, we obtain as the approximate aggregate of the whole civilized world, 68,040,000 spindles and 2,845,865,100 pounds of annual consumption, averaging 41.81 pounds per spindle.

Ellison & Co. estimate the deliveries of cotton in Great Britain during the last season at 1,270,287,000 pounds, of which 64.56 per cent. were from the United States, 15.87 per cent. from the East Indies, 7.88 per cent. from Brazil, 9.87 per cent. from Egypt, and 1.82 per cent. from other countries. The total consumption of continental Europe is estimated at 1,026,374,000 pounds, of which 46.38 per cent. were from the United States, 35.88 per cent. from the East Indies, 4.27 per cent. from Brazil, 6.50 per cent. from Egypt, and 6.97 per cent. from other countries. The aggregate deliveries of all Europe amounted to 2,296,661,000 pounds, of which 56.23 per cent. were from the United States, 25.05 per cent. from the East Indies, 6.22 per cent. from Brazil, 8.33 per cent. from Egypt, and 4.20 per cent. from other countries.

The aggregate deliveries in Europe, the proportions received from the leading cotton-countries, and the average weights of the bales delivered during the last six cotton-seasons were as follows:

## FOR ALL EUROPE.

Seasons.	Total deliveries.		From United States.	From East Indies.	From Brazil.	From Egypt.	From other countries.	Average weight per bale.
	Pounds.	Bales.						
			Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Pounds.
1870-'71 .....	2,161,724,000	5,587,000	54.47	23.45	10.76	6.03	5.29	386.9
1871-'72 .....	1,820,870,000	5,113,000	40.72	27.07	18.89	5.94	7.38	356.1
1872-'73 .....	2,083,278,000	5,528,000	46.02	27.62	13.39	7.36	5.61	376.8
1873-'74 .....	2,133,819,000	5,518,000	49.33	27.80	10.87	6.81	5.19	386.7
1874-'75 .....	2,093,100,000	5,418,000	47.75	29.80	11.35	6.09	5.01	386.3
1875-'76 .....	2,296,661,000	5,570,000	56.23	25.05	6.23	8.33	4.16	412.3

## FOR GREAT BRITAIN.

Seasons.	Pounds.	Bales.	From United States.	From East Indies.	From Brazil.	From Egypt.	From other countries.	Average weight per bale.
			Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Pounds.
1870-'71 .....	1,263,024,000	3,222,000	59.74	17.32	11.76	7.48	3.70	392
1871-'72 .....	1,127,520,000	3,132,000	45.09	21.01	21.32	7.63	4.95	360
1872-'73 .....	1,280,640,000	3,335,000	49.59	22.09	15.27	9.17	3.88	384
1873-'74 .....	1,240,706,000	3,149,000	54.01	20.96	13.12	9.05	2.86	394
1874-'75 .....	1,198,838,000	3,077,000	52.19	21.71	14.98	7.96	3.16	389.6
1875-'76 .....	1,270,287,000	3,017,000	64.56	15.87	7.88	9.87	1.82	421

## FOR THE CONTINENT.

Seasons.	Total deliveries.		From United States.	From East Indies.	From Brazil.	From Egypt.	From other countries.	Average weight per bale.
	Pounds.	Bales.						
1870-71 .....	898,700,000	2,365,000	Per cent. 47.28	Per cent. 31.84	Per cent. 8.96	Per cent. 4.16	Per cent. 7.86	Pounds. 380
1871-72 .....	693,350,000	1,981,000	33.87	36.65	15.04	3.28	11.16	350
1872-73 .....	802,638,000	2,193,000	40.58	35.02	10.53	4.60	8.27	366
1873-74 .....	893,113,000	2,369,000	43.09	36.89	7.89	3.84	8.29	377
1874-75 .....	894,262,000	2,341,000	41.91	40.52	6.78	3.63	7.16	382
1875-76 .....	1,026,374,000	2,553,000	46.38	35.88	4.27	6.50	6.97	402

The percentages in the previous tables represent not pounds but bales which vary in different supply-countries, and, consequently, the figures given are only approximations. For the season 1876-77, now in progress, the following estimates of supply are given: United States, 2,950,000 bales, averaging 440 pounds each; East Indies, 1,350,000 bales, averaging 370 pounds; Egypt, 420,000 bales, averaging 600 pounds; Brazil, 500,000 bales, averaging 160 pounds; sundry Mediterranean, 90,000 bales, averaging 350 pounds; West Indies, Peru, &c., 110,000 bales, averaging 200 pounds; total, 5,420,000 bales, averaging 402.7 pounds, and amounting to 2,183,000,000 pounds. The probable consumption in Great Britain is given at 1,297,000,000 pounds, and on the continent at 1,009,000,000 pounds, making a total of 2,306,000,000 pounds, which is 123,000,000 pounds greater than the supply. Deducting 65,000,000 pounds, the estimated surplus held by continental spinners, and there remains a net deficit of 58,000,000 pounds. This estimate assigns a yield of 4,350,000 bales in the United States; if it should reach 4,500,000 bales the surplus will only raise the stocks in port to what they were at the beginning of the season 1875-76, without leaving any surplus in the hands of spinners.

The drift of the circular, then, is that the demand would be in excess of the supply, provided the present indications of a revival of business throughout the civilized world do not prove deceptive. If trade continues dull, and if European politics continue to be disturbed by the agitations of the Eastern question, even a smaller crop than that estimated above will be sufficient to meet the prospective demand in Europe.

**COTTON IMPORTS INTO THE BRITISH ISLES.**—During the first nine months of 1876 the United Kingdom imported 6,551,066 hundred-weight of raw cotton from the United States, an increase of 870,095 hundred-weight, or 15.3 per cent. over the import of the same period in 1875. The receipts from Brazil were 359,658 hundred-weight, a decline of 35 per cent.; from Egypt, 1,029,142 hundred-weight, a gain of 168,219 hundred-weight, or 19.5 per cent.; from British India, 1,988,331 hundred-weight, a decline of 760,121 hundred-weight, or 27½ per cent.; from other countries, 101,970 hundred-weight, a decline of 90,995 hundred-weight, or 47 per cent. The entire import was 10,038,167 hundred-weight, a decline of 7,598 hundred-weight. The total value of the import was £30,653,466, a decline of £4,323,895, or about one-eighth. The import of cotton-manufactures amounted to £1,441,519 against £945,335 during the first three quarters of 1875, an increase of 52 per cent.

## MARKET-PRICES OF FARM-PRODUCTS.

NOVEMBER AND DECEMBER, 1876.

*The following quotations represent, as nearly as practicable, the state of the market at the beginning of each month.*

Articles.	November.	December.
NEW YORK.		
Flour, superfine State and western....per barrel..	\$4 60 to \$4 90	\$5 00 to \$5 30
extra State.....do.....	5 20 to 5 65	5 60 to 6 90
extra to choice western.....do.....	5 20 to 8 50	6 55 to 8 25
southern extra.....do.....	5 25 to 6 60	5 40 to 5 80
southern family.....do.....	6 65 to 8 75	6 65 to 8 75
Wheat, No. 1 spring.....per bushel..	1 25 to 1 30	1 33 to 1 35
No. 2 spring.....do.....	1 22 to 1 25	1 28 to 1 32
winter, red, western.....do.....	1 22 to ———	1 30 to 1 35
winter, amber, western.....do.....	1 33 to ———	1 34 to 1 45
winter, white, western.....do.....	1 33 to 1 35	1 34 to 1 45
Corn.....do.....	56 to 61½	53½ to 61
Oats.....do.....	31 to 49	37 to 49
Rye.....do.....	72 to 88	80 to 95
Barley.....do.....	1 08 to 1 18	80 to 85
Hay, baled, first quality for retail.....per ton..	14 00 to 18 00	14 00 to 18 00
baled, second quality for shipping.....do.....	12 00 to ———	12 00 to ———
Beef, mess.....per barrel..	8 00 to 10 00	10 50 to 11 50
extra mess.....do.....	10 00 to 11 00	12 00 to 12 50
Pork, mess.....do.....	16 00 to 17 00	17 00 to ———
extra mess.....do.....	13 50 to ———	——— to ———
prime mess.....do.....	——— to ———	——— to ———
Lard.....per pound..	9½ to 10	9½ to 10½
Butter, western.....do.....	19 to 23	16 to 26
State dairy.....do.....	24 to 33	24 to 33
Cheese, State factory.....do.....	9½ to 14	11 to 14½
western factory.....do.....	11 to 13	10 to 13½
Sugar, fair to prime refining.....do.....	9½ to 9½	9½ to 10½
Cotton, ordinary to good ordinary.....do.....	9½ to 10½	10½ to 11½
low middling to good middling.....do.....	10½ to 11½	11½ to 12½
Tobacco, lugs.....do.....	5 to 8	5 to 8
leaf, common to medium.....do.....	8 to 11	8 to 11
Wool, American XXX and picklock.....do.....	48 to 50	48 to 50
American X and XXX.....do.....	36 to 46	36 to 43
American combing.....do.....	48 to 55	48 to 57
California spring clip.....do.....	16 to 23	16 to 23
California fall clip.....do.....	14 to 22	14 to 22
BOSTON.		
Flour, western superfine spring.....per barrel..	4 25 to 4 75	4 25 to 4 75
common spring extras.....do.....	5 00 to 5 75	5 00 to 5 75
good to fancy northwestern spring.....do.....	5 75 to 9 50	5 75 to 9 25
good to fancy western winter.....do.....	6 00 to 8 50	6 00 to 8 00
southern family.....do.....	6 50 to 8 50	6 50 to 8 50
Wheat.....per bushel..	1 10 to 1 38	1 20 to 1 42
Corn.....do.....	58 to 65	53 to 66
Oats.....do.....	33 to 53	45 to 52
Rye.....do.....	75 to 80	85 to 90
Barley.....do.....	85 to 1 20	95 to 1 20
Hay, eastern and northern.....per ton..	12 00 to 20 00	12 00 to 19 00

## Market-prices of farm-products—Continued.

Articles.	November.	December.
<b>BOSTON—Continued.</b>		
Hay, western choice.....per ton..	\$15 00 to \$15 00	\$15 00 to \$18 00
Beef, mess.....per barrel..	15 00 to ———	11 00 to ———
extra mess.....do.....	12 00 to ———	13 00 to ———
family.....do.....	12 50 to 13 50	14 00 to 15 00
Pork, prime.....do.....	16 00 to 16 50	14 00 to 14 50
mess.....do.....	18 00 to ———	17 00 to 17 50
Lard.....do.....	10½ to 11½	10½ to 11½
Butter, New York and Vermont.....per pound..	18 to 33	18 to 33
western.....do.....	16 to 33	15 to 33
Cheese, New York and Vermont factory.....do.....	10½ to 13½	12 to 14½
western factory.....do.....	8 to 13	9 to 14
Sugar, fair to good refining.....do.....	9½ to 9½	9½ to 10½
Cotton, ordinary to good ordinary.....do.....	9¼ to 10¾	10½ to 11¾
low middling to good middling.....do.....	10½ to 12½	11½ to 13
Wool, Ohio and Pennsylvania.....do.....	37 to 52	40 to 52
Michigan.....do.....	34 to 40	36 to 42
other western.....do.....	33 to 40	36 to 42
pulled.....do.....	35 to 42½	20 to 42½
combing fleece.....do.....	50 to 55	50 to 57½
California.....do.....	14 to 30	14 to 30
<b>PHILADELPHIA.</b>		
Flour, superfine.....per barrel..	3 50 to 4 00	3 50 to 4 00
Pennsylvania extra to choice.....do.....	4 12½ to 6 50	4 12½ to 6 25
western extra to choice.....do.....	4 12½ to 0 00	6 00 to 6 75
Wheat, winter, white.....per bushel..	1 30 to 1 40	1 30 to 1 50
amber.....do.....	1 23 to 1 36	1 42 to 1 45
red.....do.....	1 20 to 1 29	1 20 to 1 37
Rye.....do.....	68 to 75	72 to 74
Barley.....do.....	75 to 85	60 to 95
Corn.....do.....	55 to 58	52 to 59
Oats.....do.....	23 to 41	28 to 41
Hay, baled, prime.....per ton..	——— to 17 00	16 00 to 17 00
common to fair shipping.....do.....	10 00 to 13 00	10 00 to 13 00
Beef, western mess.....per barrel..	6 00 to 8 00	6 00 to 8 00
extra mess.....do.....	10 00 to 11 00	10 00 to 11 00
Warthman's and Alburger's city family per barrel.....do.....	14 00 to ———	14 00 to ———
Pork, mess.....per barrel..	16 50 to 17 00	17 25 to 17 50
prime mess.....do.....	15 50 to 16 00	15 50 to 16 00
extra prime.....do.....	16 50 to 17 00	16 50 to 17 00
Lard.....per pound..	10½ to 15	10 to 15
Butter, choice Middle State.....do.....	30 to 38	26 to 35
choice western.....do.....	——— to ———	25 to 27
Cheese, New York factory.....do.....	——— to 14	8½ to 14½
Ohio factory.....do.....	——— to 13½	7 to 13½
Sugar, fair to good refining.....do.....	9½ to 9½	9½ to 10½
Cotton, ordinary to good ordinary.....do.....	9½ to 10	10½ to 10¾
low middling to good middling.....do.....	10½ to 12½	11½ to 12¾
Wool, Ohio and Pennsylvania X to XXX.....do.....	41 to 45	41 to 45
other western.....do.....	31 to 38	31 to 38
pulled.....do.....	22 to 36	22 to 36
combing, washed and unwashed.....do.....	38 to 52	38 to 52
tub-washed.....do.....	30 to 46	30 to 46
<b>BALTIMORE.</b>		
Flour, superfine.....per barrel..	4 25 to 4 75	4 25 to 4 50
extra.....do.....	5 25 to 6 25	5 25 to 6 75
family.....do.....	5 75 to 8 50	6 00 to 8 50
Wheat, red.....per bushel..	1 10 to 1 35	1 25 to 1 43

## Market prices of farm-products—Continued.

Articles.	November.		December.	
BALTIMORE—Continued.				
Wheat, amber .....	\$1 37	to \$1 40	\$1 45	to \$1 51
white .....	1 25	to 1 35	1 20	to 1 45
Rye .....	60	to 68	70	to 75
Oats .....	30	to 36	33	to 40
Corn .....	48	to 56½	48	to 57
Hay, Maryland and Pennsylvania .....	12 00	to 16 00	13 00	to 18 00
western .....	—	to —	—	to —
Pork mess .....	17 25	to 17 50	17 25	to —
prime mess .....	—	to —	—	to —
extra prime .....	17 00	to —	17 00	to —
Lard .....	10½	to 11½	11	to 11½
Butter, near-by receipts .....	26	to 28	22	to 27
western choice .....	25	to 26	22	to 28
Cheese, eastern factory .....	12½	to 14	13	to 15
western factory .....	7	to 13	9	to 14
Sugar, fair to good refining .....	9½	to 9½	9½	to 10
New Orleans grocery grades .....	—	to —	9½	to 10½
Tobacco, lugs .....	6½	to 9	6½	to 9
leaf, common to medium .....	9	to 11	9	to 11
Cotton, ordinary to good ordinary .....	9	to 10	9½	to 10½
low middling to good middling .....	10¼	to 11½	11¼	to 12¼
CINCINNATI.				
Flour, superfine .....	4 25	to 4 75	4 25	to 4 60
extra .....	5 25	to 5 50	5 00	to 5 30
family and fancy .....	5 65	to 7 00	5 50	to 5 75
Wheat, winter, red .....	1 20	to 1 25	1 25	to 1 32
hill, (amber) .....	1 28	to 1 32	—	to 1 40
white .....	1 28	to 1 32	—	to 1 40
Corn .....	34	to 49	40	to 44
Oats .....	28	to 35	28	to 38
Rye .....	55	to 70	70	to 71
Barley .....	60	to 1 15	80	to 1 15
Hay, baled, No. 1 .....	11 00	to 13 00	11 00	to 13 00
lower grades .....	9 00	to 10 00	8 00	to 10 00
Pork, mess .....	16 50	to 16 75	15 75	to 16 00
Lard .....	9½	to 10 00	9½	to 9½
Butter, choice .....	20	to —	20	to 23
prime .....	17	to 18	16	to 19
Cheese, prime to choice factory .....	12½	to 13	12½	to 13
Sugar, New Orleans, fair to good .....	—	to —	8½	to 9½
prime .....	—	to —	9½	to 10
Tobacco, lug .....	—	to —	—	to —
leaf .....	—	to —	—	to —
Cotton, ordinary to good ordinary .....	8½	to 9½	9½	to 10½
low middling to good middling .....	10¼	to 11	11¼	to 12¼
Wool, fleece-washed, common to fine .....	30	to 36	30	to 36
tub-washed .....	32	to 38	32	to 38
unwashed clothing .....	21	to 26	21	to 26
unwashed combing .....	27	to 32	27	to 32
pulled .....	30	to 31	27	to 31
CHICAGO.				
Flour, choice winter extras .....	6 25	to 7 25	6 25	to 7 25
common to good winter extras .....	5 00	to 6 00	5 00	to 6 00
spring extras, common to good .....	5 25	to 5 50	5 25	to 5 50
spring extras, choice .....	5 75	to 6 25	5 75	to 6 75
patent springs .....	6 00	to 7 50	6 00	to 7 50
spring superfine .....	2 50	to 40 00	3 60	to 4 00
Wheat, No. 1 spring .....	1 13	to 1 13½	1 15½	to 1 16

## Market prices of farm-products—Continued.

Articles.	November.	December.
CHICAGO—Continued.		
Wheat, No. 2 spring ..... per bushel..	\$1 11 $\frac{1}{4}$ to \$1 12	\$1 13 to \$1 13 $\frac{1}{2}$
No. 3 spring ..... do.....	1 00 to 1 01	1 05 $\frac{1}{2}$ to 1 05 $\frac{3}{4}$
Rye, No. 2..... do.....	60 to 60 $\frac{1}{2}$	66 to —
Barley, No. 2..... do.....	79 $\frac{1}{2}$ to 80	66 to 66 $\frac{1}{2}$
Corn, No. 2..... do.....	42 $\frac{1}{2}$ to 42 $\frac{3}{4}$	43 $\frac{3}{4}$ to 44
Oats, No. 2..... do.....	31 $\frac{1}{2}$ to 32 $\frac{3}{4}$	32 $\frac{3}{4}$ to 32 $\frac{1}{2}$
Hay, timothy..... per ton..	8 50 to 11 50	9 50 to 11 50
prairie ..... do.....	7 50 to 8 00	7 00 to —
Beef, mess..... per barrel..	9 50 to 9 75	9 50 to 9 75
extra mess ..... do.....	10 50 to 10 75	10 50 to 10 75
Pork, mess..... do.....	15 75 to 16 00	15 75 to 15 80
extra mess ..... do.....	— to —	12 50 to 12 75
prime mess..... do.....	12 00 to —	— to —
Lard..... per pound..	9 $\frac{1}{8}$ to 9 $\frac{1}{2}$	9 $\frac{3}{4}$ to —
Butter, choice to fancy ..... do.....	25 to 30	25 to 32
medium to good..... do.....	17 to 23	17 to 28
Cheese, good to choice factory..... do.....	11 to 12 $\frac{1}{2}$	12 to 13
Sugar, New Orleans..... do.....	— to —	9 $\frac{3}{4}$ to 10 $\frac{1}{2}$
Wool, tub-washed..... do.....	36 to 45	35 to 45
fleece-washed ..... do.....	33 to 39	33 to 37
unwashed ..... do.....	21 to 26	20 to 27
pulled..... do.....	— to —	— to —
SAINT LOUIS.		
Flour, winter, common to choice ..... per barrel..	3 50 to 7 00	3 50 to 7 00
Wheat ..... per bushel..	95 to 1 13 $\frac{1}{2}$	1 05 to 1 28
Corn ..... do.....	39 to 45	43 to 45
Rye..... do.....	50 to 59	50 to 60
Barley ..... do.....	45 to 1 15	30 to 1 15
Oats ..... do.....	28 $\frac{1}{2}$ to 35	25 to 32
Hay, timothy..... per ton..	11 00 to 13 00	11 00 to 13 00
prairie ..... do.....	7 00 to 11 00	7 00 to 11 00
Beef, mess ..... per barrel..	13 50 to 14 00	13 50 to 14 00
Pork, mess ..... do.....	16 50 to 17 50	16 50 to 17 50
Lard..... per pound..	9 to 10	9 $\frac{1}{2}$ to 10 $\frac{1}{2}$
Butter, prime to choice dairy ..... do.....	26 to 30	22 to 28
country-packed ..... do.....	18 to 22	17 to 20
Cheese, Ohio factory ..... do.....	12 $\frac{1}{2}$ to 13 $\frac{1}{2}$	12 $\frac{1}{2}$ to 13 $\frac{1}{2}$
New York factory..... do.....	13 to 14	13 to 14
Wool, tub-washed..... do.....	33 to 40	33 to 40
fleece-washed ..... do.....	— to —	— to —
unwashed ..... do.....	24 to 31	24 to 31
NEW ORLEANS.		
Flour, superfine ..... per barrel..	5 00 to —	4 75 to —
extra ..... do.....	6 00 to 6 75	5 00 to 6 00
choice to fancy ..... do.....	7 00 to 7 50	6 25 to 7 37 $\frac{1}{2}$
Corn..... per bushel..	56 to 65	54 to 65
Oats ..... do.....	41 to 50	45 to 47
Hay, choice ..... per ton..	19 00 to —	18 00 to —
prairie ..... do.....	16 00 to —	13 00 to 14 00
Beef, Texas..... per barrel..	10 00 to —	— to —
western..... do.....	14 00 to 15 00	12 00 to 15 00
Fulton market..... per half barrel..	9 75 to 10 00	8 00 to 8 50
Pork ..... per barrel..	17 50 to 18 25	18 37 $\frac{1}{2}$ to 18 50
Lard..... per pound..	10 $\frac{7}{8}$ to 11 $\frac{1}{8}$	10 $\frac{1}{2}$ to 11 $\frac{1}{4}$
Butter, choice Goshen ..... do.....	34 to —	34 to 35
choice western ..... do.....	24 to 25	22 to 23
Cheese, choice western factory..... do.....	12 $\frac{1}{2}$ to 13	12 to 12 $\frac{1}{2}$
New York cream ..... do.....	15 to 15 $\frac{1}{2}$	15 to 16

## Market-prices of farm-products—Continued.

Articles.	November.	December.
<b>NEW ORLEANS—Continued.</b>		
Sugar, fair to fully fair.....per pound..	\$0 7 $\frac{1}{4}$ to \$0 7 $\frac{3}{4}$	\$0 7 $\frac{1}{4}$ to \$0 8 $\frac{1}{8}$
prime to strictly prime.....do.....	8 to 8 $\frac{1}{2}$	8 $\frac{1}{4}$ to 8 $\frac{3}{8}$
clarified, white and yellow.....do.....	9 to 10	9 $\frac{1}{2}$ to 10 $\frac{1}{2}$
Cotton, ordinary to good ordinary.....do.....	8 $\frac{3}{4}$ to 9 $\frac{1}{2}$	— to 10 $\frac{1}{2}$
low middling to good middling.....do.....	10 $\frac{1}{4}$ to 11 $\frac{1}{4}$	11 $\frac{1}{2}$ to 12 $\frac{1}{8}$
Tobacco, lugs.....do.....	5 $\frac{1}{2}$ to 8	5 $\frac{1}{2}$ to 7 $\frac{1}{2}$
leaf, low to medium.....do.....	8 $\frac{1}{2}$ to 12	8 to 11
<b>SAN FRANCISCO.</b>		
Flour, superfine.....per barrel..	4 00 to 4 25	4 25 to 4 50
extra.....do.....	4 50 to 4 75	4 75 to 5 00
family and fancy.....do.....	5 00 to 5 50	5 00 to 5 50
Wheat, California.....per cental..	1 50 to 1 75	1 60 to 2 00
Oregon.....do.....	1 50 to 1 75	1 60 to 1 95
Barley.....do.....	90 to 1 15	90 to 1 17 $\frac{1}{2}$
Oats.....do.....	1 40 to 1 75	1 50 to 1 95
Corn.....do.....	1 10 to 1 15	1 05 to 1 10
Hay, State.....per ton..	7 50 to 13 50	10 00 to 16 00
Pork, mess.....per barrel..	23 60 to 24 00	23 00 to 24 00
prime mess.....do.....	17 50 to 18 50	18 00 to 20 00
Beef, mess.....do.....	9 00 to 10 00	9 00 to 10 00
family mess.....per half barrel..	8 50 to 10 00	8 50 to 10 00
Lard.....per pound..	13 $\frac{1}{2}$ to 15	13 to 14
Butter, overland.....do.....	20 to 22	16 to 18
California.....do.....	25 to 45	25 to 45
Oregon.....do.....	20 to 25	20 to 25
Cheese.....do.....	12 $\frac{1}{2}$ to 15	12 $\frac{1}{2}$ to 15
Wool, native.....do.....	10 to 12	10 to 12
California.....do.....	15 to 22	15 to 22
Oregon.....do.....	25 to 25	20 to 25

## LIVE-STOCK MARKETS.

<b>NEW YORK.</b>		
Cattle, extra beeves.....per cental..	10 00 to 10 25	— to 10 75
good to prime.....do.....	9 25 to 9 59	10 00 to 10 25
common to fair.....do.....	— to —	7 75 to 9 00
Texans.....do.....	6 00 to 7 50	— to —
milch-cows.....per head..	45 00 to 75 00	40 00 to 70 00
veal-calves.....per cental..	5 00 to 10 00	6 50 to 9 50
Sheep.....do.....	4 00 to 6 00	4 25 to 6 25
Swine.....do.....	5 60 to 6 12 $\frac{1}{2}$	5 90 to 6 06 $\frac{1}{2}$
<b>PHILADELPHIA.</b>		
Cattle, prime beeves.....per cental..	6 12 $\frac{1}{2}$ to 6 25	6 12 $\frac{1}{2}$ to 6 50
fair to good.....do.....	5 00 to 6 00	5 12 $\frac{1}{2}$ to 6 00
common.....do.....	3 00 to 4 75	3 50 to 5 00
Sheep.....do.....	1 00 to 5 75	1 00 to 6 12 $\frac{1}{2}$
Swine, corn-fed.....do.....	8 25 to 8 75	7 00 to 8 00
<b>BALTIMORE.</b>		
Cattle, best beeves.....per cental..	4 87 to 5 25	— to —
first quality.....do.....	4 00 to 4 75	— to —
medium or good quality.....do.....	3 12 to 3 75	— to —
ordinary.....do.....	2 25 to 3 00	— to —

## Live-stock markets—Continued.

Articles.	November.		December.	
BALTIMORE—Continued.				
Cattle, general average of the market..per cental..	\$3 62	to ———	———	to ———
most of the sales.....do.....	3 12	to \$4 25	———	to ———
milch-cows.....do.....	———	to ———	———	to ———
Sheep.....per cental..	2 00	to 4 75	———	to ———
Swine.....do.....	7 00	to 7 87½	———	to ———
CINCINNATI.				
Cattle, good to prime butchers' steers..per cental..	3 75	to 4 25	\$4 25	to \$4 40
fair to medium.....do.....	2 50	to 3 50	2 60	to 3 50
common.....do.....	2 00	to 2 40	2 00	to 2 50
milch-cows.....per head..	———	to ———	———	to ———
veal-calves.....per cental..	———	to ———	———	to ———
Sheep.....do.....	2 25	to 4 50	2 25	to 4 50
Swine.....do.....	4 90	to 5 60	5 00	to 5 65
CHICAGO.				
Cattle, extra graded steers.....per cental..	———	to ———	———	to ———
choice beeves.....do.....	4 60	to 4 75	———	to 5 00
good beeves.....do.....	4 10	to 4 40	———	to ———
medium.....do.....	3 30	to 4 00	2 80	to 3 50
inferior natives.....do.....	1 75	to 2 90	2 25	to 2 50
Texans, through droves.....do.....	2 25	to 3 25	———	to ———
Sheep.....do.....	3 00	to 4 25	3 25	to 4 12½
Swine.....do.....	4 25	to 6 00	5 50	to 6 00
SAINT LOUIS.				
Cattle, good to choice native steers...per cental..	4 50	to 4 90	4 50	to 4 90
common to fair natives.....do.....	3 25	to 4 25	3 25	to 4 25
inferior to common.....do.....	2 00	to 3 25	2 00	to 3 25
Texans, fair to choice.....do.....	3 00	to 4 00	3 00	to 4 00
Sheep.....do.....	2 50	to 4 50	2 50	to 4 50
Swine.....do.....	5 50	to 6 25	5 50	to 6 25
Horses, plug.....per head..	30 00	to 65 00	30 00	to 65 00
plain to choice southern.....do.....	50 00	to 90 00	50 00	to 90 00
street-car.....do.....	75 00	to 125 00	75 00	to 125 00
heavy draught.....do.....	100 00	to 130 00	100 00	to 130 00
good drivers.....do.....	175 00	to 225 00	175 00	to 225 00
extra.....do.....	225 00	to 250 00	225 00	to 250 00
auction horses and ponies.....do.....	25 00	to 45 00	25 00	to 45 00
Mules, 14 to 15 hands high.....do.....	85 00	to 120 00	85 00	to 120 00
15 to 16 hands high.....do.....	115 00	to 150 00	115 00	to 150 00
extra.....do.....	175 00	to 185 00	175 00	to 185 00
NEW ORLEANS.				
Cattle, Texas beeves, choice.....per head..	35 00	to 45 00	35 00	to 45 00
first quality.....do.....	———	to 35 00	———	to 35 00
second quality.....do.....	25 00	to 30 00	25 00	to 35 00
western beeves.....per cental..	———	to ———	———	to ———
milch-cows.....per head..	40 00	to 90 00	50 00	to 100 00
veal-calves.....do.....	7 00	to 9 00	7 00	to 9 00
Sheep.....do.....	2 00	to 6 00	2 00	to 6 00
Swine.....per cental..	5 00	to 7 00	5 50	to 7 00
Horses, good combined.....per head..	150 00	to 200 00	———	to ———
plug.....do.....	100 00	to 150 00	———	to ———
common.....do.....	40 00	to 80 00	———	to ———
Mules, well broken, first class.....do.....	175 00	to 200 00	———	to ———
second-class.....do.....	100 00	to 150 00	———	to ———

## FOREIGN MARKETS.

**WHEAT.**—In the United Kingdom the month of November was favorable to farm-operations till about the close of the third week, when a sharp spell of frost set in, but it was again succeeded by a mild temperature with genial rain. The conditions of growth for fall-wheat have on the whole been quite favorable, and are in striking contrast to the disastrous seed-time of 1875. The fall-sowing was completed in good order. Supplies of British wheat at the country markets were small, and dullness the prevailing feature of the home trade, causing a decline at several points of 1s. per quarter for English wheat. In the absence of authorized inquiries by government into the yield of the crops, several leading statisticians have been estimating the wheat yield. The *Agricultural Gazette* sets down the aggregate product at between 95,070,000 and 102,179,600 bushels; the *Yorkshire Post*, from 96,771,000 to 103,365,000; Mr. Kains-Jackson, 98,756,000; the *Farmer*, 90,526,000; the *Magnet*, 98,756,000; the *Mark Lane Express*, 92,584,000; Mr. Scott, 88,960,000. The average of these estimates is about 96,600,000. The population of the United Kingdom is estimated at 33,000,000, consuming in the aggregate about 180,000,000 bushels of wheat. This will require a foreign import of nearly 90,000,000 bushels. Other estimates raise the necessary import to at least 100,000,000 bushels. Changes in the British land system and in the conditions of cereal production are foreshadowed by movements already inaugurated, which will in a marked degree affect the future demand for foreign grain.

Considerable anxiety has been felt in regard to the supply of present demands, especially in view of the falling off in the American import. Supplies from Russia and India were unusually large, while American receipts had largely fallen off, especially from Atlantic ports. But as the Black Sea ports will soon be closed for the winter, America is looked to as the main source of supply. The movement of American crops to the seaboard has been very slow on account of the unwillingness of the great railway-lines to furnish transportation at existing rates of tariff. This slowness of transatlantic grain movements, together with the chronic uneasiness growing out of the unsettled state of the eastern question and the liability of a general war, had kept the local grain-trade quite firm and had made holders very unwilling to part with their stocks.

The French crop of wheat was also short, being estimated by the *Bulletin des Halles*, of Paris, at between 85,000,000 and 90,000,000 hectoliters, (241,214,700 and 255,403,800 bushels.) Its value was supposed to be enhanced 4 or 5 per cent. by the superior quality of the grain. Subsequently the *Echo Agricole*, from returns by 3,500 correspondents in all parts of the wheat-growing region, estimated the wheat-area of 1876 at 16,383,540 acres, yielding 256,726,250, an average of 12.6 bushels per acre. This crop is somewhat larger than that of 1875, as estimated by M. Banal, and about two-thirds of the large crop of 1874. The domestic consumption is estimated by the last-named statistician at 204,322,040 bushels, besides 39,729,480 bushels required for seed, making a total consumption of 243,051,000 bushels, which leaves but a small margin for export.

The sales of English wheat during the week ending November 18 were 48,063 quarters, at 48s. 3d. per quarter, against 48,012 quarters, at 47s. 8d., during the corresponding week of 1875. The London averages

were 49s. 4d. on 1639 quarters. The imports into the United Kingdom for the week closing November 11, were 744,753 cwt. The tendency of the market was to close dealing, buyers not readily yielding to the demands of the sellers. In Mark Lane, Essex and Kent white brought 45s. to 52s. per quarter; ditto, red, 43s. to 49s.; Norfolk, Lincolnshire, and Yorkshire, red, 44s. to 46s.; Dantzic, mixed, 52s. to 55s.; Königsberg, 50s. to 45s.; Ghirka, 45s. to 47s.; Russian, hard, 44s. to 46s.; Saxonska, 47s. to 50s.; Danish and Holstein, red, 46s. to 49s.; American, 48s. to 53s.; Chilian, white, 48s.; Californian, 50s.; Australian, 51s. to 53s.

At Liverpool, British white wheat was quoted at 10s. 1d. to 10s. 7d. per cental; ditto, red, 9s. 7d. to 10s. 1d.; Australian, 10s. 8d. to 10s. 10d.; Oregon, 10s. 6d. to 10s. 8d.; Californian, 10s. 4d. to 10s. 6d.; club and choice, 10s. 7d. to 10s. 8d.; Chilian, 9s. 8d. to 10s. 1d.; American white, 9s. 11d. to 10s. 3d.; ditto, red winter, 9s. 7d. to 10s. 10d.; choice spring, 10s. 3d. to 10s. 5d.; No. 1 spring, 9s. 11d. to 10s. 2d.; No. 2 spring, 9s. 7d. to 9s. 10d.; No. 3 spring, 9s. 1d.; Canadian white, 9s. 11d. to 10s. 3d.; red club and golden drop, 10s. 1d. to 10s. 5d.; Bombay, 9s. 6d. to 9s. 10d.; Calcutta, 8s. 8d. to 9s. 4d.; French, 10s. to 10s. 6d.; Egyptian, 7s. 3d. to 9s. 3d.

In Paris the prevailing character of the wheat-trade was firmness, but purchases for consumption were made sparingly, while holders were not anxious to sell. The average price of wheat was 47s. 7d. per quarter. During the week ending November 18, 28 French provincial markets had advanced or had shown an advancing tendency, against 12 the previous week; 58 stood calm to firm against 61, and 14 showed a declining tendency against 24, the previous week. At Bordeaux, the millers, finding but slim profits in existing rates, preferred to stop their machinery. A declining tendency is noted at Berlin, Hamburg, and Dantzic. At Alexandria, Egypt, a demand in excess of supplies had somewhat raised prices.

**FLOUR.**—Imports into the United Kingdom for the week ending November 11, 105,190 cwt. against 146,538 the previous week. In Mark Lane, the best town households brought 38s. to 43s. per 280 pounds; best country household, 36s. to 38s.; Norfolk and Suffolk, old, 32s. to 33s.; French, 30s. to 35s.; American and extra, per barrel, 23s. to 26s. At Liverpool, English and Irish superfines were quoted at 35s. to 38s.; ditto, extras, 42s. to 47s.; French, 38s. 6d. to 46s. 6d.; Trieste, 47s. 6d. to 54s. 6d.; California and Oregon, 37s. to 42s. 6d. American, western and extra State, 25s. 6d. to 28s. 6d.; Batimore and Philadelphia, 25s. 6d. to 29s. 6d.; Ohio and extra, 27s. 6d. to 30s. 6d.; extra Canadian, 27s. to 29s.; patent barrel, 32s. to 37s. In Paris superior flour averaged about 37s. per 280 pounds.

**MAIZE.**—In Mark Lane, white maize brought 28s. to 29s. per quarter; ditto, yellow, 26s. to 27s. At Liverpool, American new white was quoted at 29s. to 29s. 6d. per 480 pounds; mixed, 26s. to 26s. 3d.; Galatz, 27s. 9d. to 28s.; Don, 27s. 6d. to 28s.

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